DOCUMENT RESUME

ED 283 674 SE 048 209

TITLE Sub-Regional Workshop on Teacher Training in Environmental Education for Africa (Nairobi, Kenya, April 13-26, 1986). Final Report.

INSTITUTION United Nations Educational, Scientific, and Cultural Organization, Paris (France). Environmental Education Section.

PUB DATE 86

NOTE 196p.

AVAILABLE FROM Unesco, 7 place de Fontenoy, 75700 Paris, France.

PUB TYPE Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.

DESCRIPTORS Course Content; *Course Descriptions; Elementary School Science; Elementary Secondary Education; *Environmental Education; *Foreign Countries; *International Cooperation; International Organizations; *International Programs; Learning Modules; Science and Society; Secondary School Science; Social Studies; *Teacher Education

IDENTIFIERS *Africa; UNESCO

ABSTRACT

This document represents the final report of a workshop conducted by the Kenya Science Teachers' College in cooperation with Unesco's International Environmental Education Program (IEEP). The workshop was designed to: (1) familiarize teacher educators in Africa with the contents of a series of preservice and inservice teacher training modules in environmental education prepared by IEEP; (2) explore ways to adapt and use the modules in Unesco member states; (3) identify activities and documents on teacher training in environmental education; and (4) foster the exchange of information and experience in the development of environmental education programs in Africa. Included are the workshop agenda, descriptions of the preservice and inservice teacher training modules, and comments on a proposed environmental education course syllabus for teacher education colleges in Kenya. (TW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED283674

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it

☐ Minor changes have been made to improve reproduction quality

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

B. Abdel Khafoor Shayeb

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

SE 048 209

Sub-Regional Workshop

on

Teacher Training in Environmental Education
FOR AFRICA

13-26 April, 1986

FINAL REPORT

Organized by

KENYA SCIENCE TEACHERS COLLEGE
In co-operation with
UNESCO–UNEP International Environmental Education Programme

TABLE OF CONTENTS

I Introduction 1

II Proceedings of the Workshop 7

III Presentation of Country Reports 15

IV Presentation of Unesco-UNEP International Environmental Education Programme (IEEP) 22

V Strategies for Curriculum Development and Teacher Training in Environmental Education

A. Strategies for Developing an Environmental Education Curriculum 27

B. Strategies for the Training of Teachers in Environmental Education 41

VI Training of Primary school Teachers and Supervisors in Environmental Education

A. EE: Module for Pre-service Training of Teachers and Supervisors for Primary schools 48

B. EE: Module for In-service Training of Teachers and Supervisors for Primary schools 57

VII Training of Secondary School Science Teachers and Supervisors in Environmental Education

A. EE: Module for Pre-service Training of Science Teachers and Supervisors for Secondary schools ... 73

B. EE: Module for In-service Training of Science Teachers and Supervisors for Secondary Schools ... 90

VIII Training of Secondary School Social Science Teachers and Supervisors in Environmental Education

A. EE: Module for Pre-service Training of Social Science Teachers and Supervisors for Secondary Schools 102

B. EE: Module for In-service Training of Social Science Teachers and Supervisors for Secondary Schools 114

IX A brief Analysis of Environmental Education modules for Pre-service and In-service Training of Teachers and Supervisors for Primary and Secondary Schools ... 126

X Recommended Activities and Documents on Teacher Training in Environmental Education to be Developed by IEEP 128

XI Comments and critiques on the draft Sourcebook in Non-formal Environmental Education 128

XII Comments and critiques on proposed EE Syllabus for Teacher Diploma Colleges in Kenya 134

XIII Closing of the Workshop 135

Appendices

1. List of Working Documents 138

2. Time-table of Work 139

3. Opening and Closing Speeches 143

4. List of Participants 155

5. Report on Field Trips 159

6. Resume' of Country Reports 165

7. Proposed Environmental Education Syllabus for Teacher Diploma Colleges in Kenya 183

1. Background of the Workshop

The Subregional Workshop on Teacher Training in Environmental Education for Africa was organized under Unesco contract by Kenya Science Teachers' College (KSTC) in cooperation with Unesco-UNEP International Environmental Education Programme (IEEP). The Workshop was conceived in the context of Unesco's Programme and Budget for 1984-1985 as an activity of IEEP, Division of Science, Technical, and Environmental Education.

Unesco prepared the objectives, agenda, information note, draft invitation letter and the working documents for the workshop. Further, Unesco identified Member States to be invited, provided the needed funds as well as Environmental Education reference documents for the workshop. Dr. Abdul Ghafoor Ghaznawi, Programme Specialist in Environmental Education, Unesco, Paris assisted in the organization of and provided technical support to the workshop.

Kenya Science Teachers' College was chosen the organizer of the workshop because of its experience and close collaboration with Unesco in the last five years especially in the development of training materials in Environmental Education. Environmental Education Module for In-service Training of Social Science Teachers and Supervisors for Secondary schools (EE Series No.10) which has served as one of the working documents of the workshop was prepared under a Unesco contract by the Department of Environmental Science of KSTC.

For the preparation and organization of the above mentioned workshop, Kenya Science Teachers' College issued invitation to identified Member States, provided economy air travel tickets to participants, received them at the airport and accommodated them at Silver Springs Hotel, Nairobi. KSTC provided lecture rooms and local materials for the workshop. Furthermore, KSTC provided eight resource persons each one of whom made a resume' of and a discussion guide on each of the working documents of the workshop provided by Unesco. KSTC prepared the final report of the workshop and reproduced it after consultation with Unesco.

2. Objectives of the Workshop

i. To familiarize teacher educators with the contents of a series of preservice and inservice teacher training modules in Environmental Education (EE) prepared by Unesco-UNEP International Environmental Education Programme;

ii. To explore ways and identify institutions for local adaptation and use of the teacher training modules in Environmental Education in the participating Member States;

iii. To identify activities and documents on teacher training in Environmental Education to be developed by IEEP at subregional, regional and international levels;

iv. To foster exchange of information and experience in the development of Environmental Education in the subregion.

i. Opening of the workshop.

ii. Country reports.

iii. Presentation on Unesco-UNEP International Environmental Education Programme.

iv. Strategies for developing an Environmental Education Curriculum.

v. Strategies for the training of teachers in Environmental Education.

vi. Training of primary school teachers and supervisors in Environmental Education.

   a) Environmental Education: Module for Pre-service Training of Teachers and Supervisors for Primary Schools.

   b) Environmental Education: Module for In-service Training of Teachers and Supervisors for Primary Schools.

vii. Training of secondary school science teachers and supervisors in Environmental Education.

   a) Environmental Education: Module for Pre-service Training of Science Teachers and Supervisors for Secondary Schools.

   b) Environmental Education: Module for In-service Training of Science Teachers and Supervisors for Secondary Schools.

viii. Training of secondary school social science teachers and supervisors.

   a) Environmental Education: Module for Pre-service Training of Social Science Teachers and Supervisors for Secondary Schools.

   b) Environmental Education: Module for In-service Training of Social Science Teachers and Supervisors for Secondary Schools.

ix. Recommended activities and documents on teacher training in Environmental Education to be developed by Unesco-UNEP International Environmental Education Programme (IEEP) at subregional, regional and international levels.

x. Study of a draft Sourcebook in Nonformal Environmental Education and providing comments and critiques for its revision.

xi. Closing of the workshop.

4. Participants

Member States invited to the workshop were Ethiopia, Kenya, Malawi, Rwanda, Somalia, Sudan, Tanzania, and Uganda. Seventeen participants and five observers from Ethiopia, Kenya, Malawi and Tanzania attended the workshop. (For the list of participants see Appendix -4).

5. Date and Venue

The workshop was organized from 14 to 26 April, 1986 in the premises of Kenya Science Teachers' College, Nairobi Kenya.

6. Bureau of the Workshop

In the first plenary session under the Chairmanship of Dr. Abdul Ghafoor Ghaznawi, Unesco, Paris, the workshop elected the following Bureau:

Chairman	- Mrs. Ellen Wanaswa (Kenya).
Deputy - Chairman	- Mr. Simeon Baxton Mawindo (Malawi).
Rapporteur	- Mr. Abubakar R. Rajabu (Tanzania).

7. Steering Committee

Chairman	- Dr. Abdul GHAFOOR Ghaznawi, Unesco, Paris.
Members:	- Mrs. M. G. Muthoka (Kenya).
	- Mrs. Ellen Wanaswa (Kenya).
	- Mr. S. B. Mawindo (Malawi).
	- Mr. A. R. Rajabu (Tanzania)
	- Miss A. B. Rego (Kenya).

8. Drafting Committee

The following served in drafting the final report of the workshop:

Chairman	- Mr. P. M. Namasaka (KSTC).
Members:	- Mr. A. R. Rajabu (Tanzania).
	- Mr. F. Wamae (KSTC).
	- Mr. Mbaka Njeru (KSTC).
	- Dr. Abdul Ghafoor Ghaznawi (Unesco, Paris).

9. Resource Persons

i. Mr. B. O. K'OMUDHO, Head, Environmental Education/Information Section, National Environmental Secretariat, Nairobi.

ii. Mr. P. W. Munga, Principal, Kenya Science Teachers' College, Nairobi.

of Education, Nairobi.

iv. Mr. I. N. Mulili, Dean of Students, Kenya Science Teachers' College, Nairobi.

v. Mr. P. M. Namasaka, Deputy Principal, Kenya Science Teachers' College, Nairobi.

vi. Mr. Mbaka Njeru, Tutor, Kenya Science Teachers' College, Nairobi.

vii. Dr. G. M. Nguru, Dean of Faculty of Academic Studies, Daystar University College, Nairobi.

viii. Miss A. B. Rego, Principal Lecturer/Head, Environmental Science Department, Kenya Science Teachers' College, Nairobi.

10. Working Groups

Group 1

Chairman: Mr. R. Barasa

Rapporteur: Mr. S. K. Mbarire

Members: Mr. P. W. Munga
Mrs. M. Momanyi
Mrs. Z. Rimbui
Mr. M. Yiga-Matovu
Mr. G. K. Awash
Mrs. M. N. Karanja
Mrs. E. Wanaswa
Mr. A. S. Mohmoud
Mr. N. Mbaka
Mr. F. Wamae
Rev. B. Mwangi

Group 2

Chairman: Mr. B. K'omudho

Rapporteur: Mr. C. Oyugi

Members: Mr. P. M. Namasaka
Mr. S. Mawindo
Mr. A. R. Rajabu
Mr. I. Mulili
Dr. A. Ghafoor
Mr. J. Otewa
Miss A. B. Rego
Mrs. M. G. Muthoka

11. Unesco Secretariat

Dr. Abdul Ghafoor Ghaznawi, Programme Specialist in Environmental Education, Division of Science, Technical and Environmental Education, Unesco, Paris.

12. Methods of work

The work of the workshop involved lectures, discussions, group work, presentation and consolidation in plenaries of the reports of working groups, presentation on the activities of Thogoto Teachers' College, Educational field trips to Nairobi National Park and Animal Orphanage and the Rift Valley Environs, a visit to Karen Appropriate Technology Centre, and film shows of Africa Forest and Desert/Living Lakes. The Steering Committee of the Workshop was convened every day either late in the afternoon or early in the day before the beginning of the session for overseeing the work of each day and examining the plan of work for the next day as well as refining the discussion guide of each day for guiding the discussion of the two Working Groups. The Drafting Committee was also convened each evening for overseeing the preparation of the report of the plenary and group sessions of each day.

1. OPENING SESSION

The Workshop Opening Ceremony started on the 14th April, 1986 at 09.55 a.m. East African time.

Mr. P. W. Munga, Principal of Kenya Science Teachers' College welcomed all participants to Kenya Science Teachers' College (KSTC) and informed them that KSTC prepares students to teach at Secondary School level who are well versed in Environmental issues through Environmental Science Department. He further informed participants that the Workshop programme was coordinated by Mrs. M. G. Muthoka and Miss B. Rego. He then invited Dr. A. Ghafoor Ghaznawi, a Programme Specialist in Environmental Education, Unesco, Paris to make some opening remarks.

Dr. ABDUL GHAFOOR GHAZNAWI, Programme Specialist in Environmental Education, Unesco, Paris, welcomed the audience on behalf of Unesco to the Workshop organized under Unesco Contract by Kenya Science Teachers' College (KSTC) in cooperation with Unesco - UNEP International Environmental Education Programme (IEEP). He also added that the Workshop is conceived in the context of Unesco's Programme and Budget for 1984 - 1985 (paragraph 10922) and in a follow-up of the following activities of Unesco-UNEP International Environmental Education Programme in Africa.

(i) Regional Meeting of Experts on EE for Africa, Brazzavile September, 1976.
(ii) Regional Training Workshop on EE for Africa, Dakar, December, 1978.
(iii) National Training Workshop in EE in Burkina Faso, Central African Republic, Benin, Ethiopia, Guinea - Bissau, Ivory Coast, Malawi, Rwanda, Senegal, Sierra Leone and Zaire.
(iv) Pilot projects in Kenya, Burkina Faso, Mali and Senegal.

After elaborating the objectives of the Workshop, Dr. Ghafoor Ghaznawi mentioned that eight documents prepared by IEEP will be presented and discussed at the Workshop as working documents. He further added that the outcome of the Workshop will be reflected in a substantive final report which will be disseminated to teacher education institutions and professionals active in the development of Environmental Education.

Finally on behalf of Unesco, Dr. Ghafoor Ghaznawi thanked the Kenya Government for facilitating the organisation of the Subregional Workshop on Teacher Training in EE for Africa. He also thanked the Principal of KSTC, Mr. P. W. Munga, and KSTC staff for hosting and organizing the Workshop with Unesco - UNEP International Environmental Education Programme. (For full text see Appendix -3 (a)).

The official opening of the Subregional Workshop for Teacher Training in Environmental Education for Africa, Nairobi, Kenya was done by the Director of Education, Ministry of Education, Science and Technology, Kenya, Prof. J. M. Waithaka.

The Director welcomed all the participants especially those from outside the Republic of Kenya and told them to feel completely at home during their stay in Kenya.

The Director indicated that the Workshop is taking place at the right time. The deliberations and conclusions of the workshop will enrich Curriculum in Kenyan Schools as the objectives of the workshop are relevant to the Kenyan Education System. Recommendations and deliberations will be eagerly awaited for, to see which could be implemented in schools and also in institutions of higher learning not only in the sub-region but indeed worldwide.

The participants were asked to look into the problem of teaching materials on Environmental Education at global level. He illustrated this by telling the participants that, one of the modules being worked on was prepared at Kenya Science Teachers' College by Environmental Science lecturers. The module is not only for the sub-region but its content is to be used in the five continents. The modules are being or will be effectively used as resource materials in pre-service and in-service of training of teachers in Environmental Education at all levels i.e. Primary, Secondary or even post secondary in the Education Faculties in Universities.

On behalf of the Ministry of Education, Science and Technology, the Director extended his sincere thanks and appreciation to Unesco for holding the workshop and secondly to the Principal, Kenya Science and Environmental Science Department for making necessary arrangements for the workshop to take place and having taken part in the activities of Unesco-UNEP International Environmental Education Programme.

The Director also extended his special welcome to the UNESCO representative, Dr. Abdul Ghafoor Ghaznawi, and to the participants from Tanzania, Malawi, Ethiopia, Kenya, Somalia and he stressed the HARAMBEE call in Kenya, meaning "Let's Work Together" to achieve a common Goal of Development without Destruction.

Finally the Director highlighted on the Kenya Government's efforts to promote Environmental Education in a practical way e.g. building of gabions, tree planting etc.

The Ministry of Education, Science & Technology in Kenya has taken measures to ensure the introduction and encouragement of Environmental Education at all levels of the education system. Materials are currently being developed at the Kenya Institute of Education to meet this need.

Finally the Director asked the participants to work in the spirit of "HARAMBEE" during the workshop at the Sub-regional level. (For full text see Appendix - 3(b)).

The Deputy Principal of Kenya Science Teachers College, Mr. P. M. Namasaka moved a vote of thanks to the Unesco Representative Dr. Ghafoor Ghaznawi, Director of Education, Science and Technology, Kenya for allowing the Workshop to take place at Kenya Science Teachers' College, which was a great honour to the College.

Plenary and group sessions

The opening session on 14th April, 1986 was chaired by Mr. P. W. Munga, Principal, Kenya Science Teachers College (KSTC). Dr. Abdul Ghafoor Ghaznawi welcomed the audience on behalf of Unesco and elaborated the objectives of the workshop. The workshop was officially opened by Prof. P. Waithaka, Director of Education, Ministry of Education, Science and Technology. Mr. P. M. Namasaka, Deputy Principal, KSTC rendered a vote of thanks.

After election of the bureau of the workshop, country reports from Kenya and Ethiopia were presented.

Mr. P. W. Munga, Principal, KSTC, gave a welcoming lunch which was attended by all participants and observers of the workshop.

The afternoon session of the workshop was devoted to the presentation and discussion of country reports from Malawi and Tanzania.

The morning sessions of 15th April, 1986 chaired by Mrs. E. Wanaswa were devoted to presentation by Dr. Abdul Ghafoor Ghaznawi on the background and activities of Unesco-UNEP International Environmental Education Programme followed by the presentation of the documents on strategies for Developing an Environmental Education Curriculum by Mr. B. O. K'OMUDHO. In the afternoon session the workshop went into two working groups to further study the above documents on the basis of a discussion guide. Group reports were made and conclusions drawn.

On 16th April, 1986 under the Chairmanship of Mr. Mawindo the document on strategies for the Training of Teachers in EE was presented by Mr. P. W. Munga. It was followed by group work, reporting and drawing conclusions. The afternoon was devoted to field trip to Nairobi National Park and Animal Orphanage.

On 17th April, 1986 the document entitled EE: Module for Pre-service Training of Teachers and Supervisors for Primary Schools was presented and discussed by Mr. P. H. Ogula. The working groups discussed the modules on the basis of a discussion guide and presented their reports to the plenary session. A presentation and demonstration was made by Thogoto Teachers College in the afternoon.

In the evening a dinner was hosted by Mr. P. W. Munga and Dr. Abdul Ghafoor Ghaznawi in honour of the participants of the Workshop. Participants and observers as well as Dr. E. Wright and Dr. E. Rugumayo from Environmental Education and Training Unit of UNEP were present at the dinner.

On 18th April, 1986 a presentation was made by Mr. I. N. Mulili on EE: Module for Inservice Training of Teachers and Supervisors for Primary Schools. Two working groups discussed the module further on the basis of a discussion guide and reported to the plenary session for consolidation and drawing conclusions.

The morning session of Saturday 19th April, 1986 was devoted to the presentation and discussion by P. M. Namasaka on EE: Module for Preservice Training of Science Teachers and Supervisors for Secondary Schools. The workshop went into two working groups for further discussion of the module which were reported to the plenary session for drawing conclusions. The afternoon session

was devoted to Environmental Education Film Show.

On 21st April, 1986 a presentation was made by Mr. Mbaka Njeru on EE: Module for Inservice Training of Science Teachers and Supervisors for Secondary Schools. He led a discussion on the module which was followed by work in two groups on the basis of a discussion guide. The reports were submitted and conclusions drawn at plenary session. The afternnon was devoted to a visit to Karen Appropriate Technology Centre.

On 22nd April, 1986 Dr. G. M. Nguru presented and discussed the document EE: Module for Pre-service Training of Social Science Teachers and Supervisors. It was followed by group work on the basis of a discussion guide. Group reports were submitted at plenary session. In the afternoon session Mr. P. W. Munga explained the field trip to the Rift Valley and its geography.

This was followed by a session of comments and critiques by eight working groups on the eight chapters of the draft Source-book in Non-formal Environmental Education to be utilized in its revision. Around 17 hours Mrs. M. Muthoka, Miss A.B. Rego and Dr. Abdul Ghafoor Ghaznawi answered a series of questions on the workshop and its objectives and the activities of IEEP in Africa on television for the information of the general public.

On 23rd April, 1986 Miss A. B. Rego presented and discussed the document EE: Module for In-service Training of Social Science Teachers and Supervisors for Secondary Schools. This was followed by group work. Reports were submitted at plenary and conclusions drawn. The afternoon sessions were devoted to formulation of mechanism and identification of institutions for local adaptation of the series of modules. This was followed by recommending activities and documents on teacher training in EE to be developed by Unesco-UNEP International Environmental Education Programme at sub-regional, regional and international levels. Then the draft Environmental Education syllabus of teacher Diploma Colleges of Kenya was presented for comments.

Thursday 24th April, 1986 was devoted to an educational field trip to the Rift Valley guided by Mr. P. W. Munga.

On 25th April, 1986 the draft final report of the workshop was studied and Unesco and KSTC were requested to incorporate the suggested amendments and edit the report for reproduction and dissemination.

The above plenary sessions of the workshop were chaired by Mrs. Ellen Wanaswa (Kenya).

The Sub-regional Workshop on Teachers in Environmental Education for Africa was declared closed in the afternoon session on 25th April, 1986 by Mr. T. Sitima, the Chief Inspector of Schools, Kenya.
(For full text see Appendix 3 (c))

ACKNOWLEDGEMENT

The following was expressed by Mr. Awash Gebru Kidane, participant from Ethiopia on behalf of the other participants.

On behalf of the workshop participants and on my behalf permit me first to begin by expressing our deep gratitude to KSTC for hosting this important Sub-regional Workshop on Teacher Training in Environmental Education for Africa. Their welcoming us at the airport cannot be forgotten. We take great pleasure in being here in the beautiful city of Nairobi, the capital of Kenya. We very well know that the people of Kenya are noted for their hospitality.

Permit me once again, on behalf of the Workshop participants and on my behalf, to express the certainty and conviction that the Sub-regional Workshop on Teacher Training in Environmental Education for Africa is a very important one. To familiarise teacher educators with the contents of the series of teacher training modules in Environmental Education prepared by Unesco-UNEP International Environmental Education Programme (IEEP), exploring ways and identifying institutions for local adaptation and use of these modules in the participating Member States etc. is an important step in the right direction.

The discussions which have taken place on environmental problems and the strategies studied on curriculum development and teacher training in Environmental Education have demonstrated the urgency and importance for the solution of environmental problems in the sub-region.

I am sure that none of us will ever forget the days we have spent in Nairobi in general and the National Park and Orphanage of Nairobi and the trip to the Rift Valley in particular.

Last but not least, the special dinner given to the participants at Silver Springs Hotel cannot be forgotten.

Finally, on behalf of the Workshop participants and on my own behalf, our heartfelt gratitude go to KSTC and Unesco-UNEP/IEEP for the timely organization of the Sub-regional Workshop on Teacher Training in Environmental Education for Africa.

III. PRESENTATION OF COUNTRY REPORTS

1. MAJOR ELEMENTS COVERED BY COUNTRY REPORTS

	ELEMENT	ETHIOPIA	KENYA	MALAWI	SOMALIA	TANZANIA
a)	Physical Aspects	Composed of a broad flat-table land, deep, steep and sided gordges; wide plains and rugged mountain.	Falls into three zones: Coastal plains, Foreland plateau and Nyanza Plateau which dips into Lake Victoria.	Characterized by lowlands and very high plateaux.	Has longest coast next to South Africa. It is mostly lowland with an average height of 915m above sea level.	Falls into three zones: Island and coastal plain, inland plateau and Lake Basin
b)	Cultural Factors	Within it are found different Nationalities with different cultures and languages.	African population consists of Bantus, Nilotes and Cushites. Bantus are sedentary farmers while Cushites lead a nomadic life and Nilotes practise mixed farming.	Consists predominantly of Bantus living harmoniously with other nationalities.	80% of its people rear livestock (cattle, camels) and most of them are nomadic. 20% of the Somali people practise mixed farming.	Has over 130 ethnic groups. The Sukuma and Nyamwezi from the Bantu stock are the majority. There are also small groups of Khoisan and Cushite peoples.
c)	Social Factors	Most of the peoples are agrarian.	In the past people settled in areas with good rainfall and soil. At the moment the trend is movement from places of birth to places of work be it rural or urban.	Most of the 6.5 million people are rurally based and practice agriculture.	Most of the Somalia people are nomadic with an increased population of human and livestock. There is large influx of refugees with their livestock into Somalia.	Most of the people have been resettled in villages in which social and public facilities are being developed.

d)	Economic Factors	The Economy is basically agrarian with potential for various minerals.	Practices mixed farming with many kinds of business.	Fertile soils have made the country self-sufficient in food production and agriculture is the backbone of the country's economy.	Somali practices mixed farming and rearing of live-stock as the back-bone to the country's economy. There is rapid population growth coupled with rural to urban migration resulting into rapid urbanization.	The economy has been giving priority to basic industries, agriculture, and exploitation of the country's natural resources.
2.	ENVIRON-MENTAL PROBLEMS	- Soil erosion - Deforestation due to agricu-lture, fuel for domestic use and wood for construction purposes, fire - Water pollution leading to spread of infectious diseases. - Drought.	- Deforestation - Desertification - Floods - Drought - Soil erosion - Pests and diseases - Sewage and industrial wastes - Hailstone and lightning. - Overgrazing.	- Deforestation: caused by cutting down trees for fuel, poles, tobacco processing - Pollution caused by both domestic chemicals and industrial wastes. - Pest diseases - Soil erosion.	- Desertification due to overgrazing and destruction of forests for timber, firewood, charcoal and cultivation of marginal lands. - Waterlogging - Salination of irrigated lands - Rapid advance of coastal sand-dunes. - Soil Erosion.	- The land that does not receive rainfall is infested by tsetse flies and some is semi-arid. - Desertification due to deforestation for fuel wood for domestic use, agriculture and tobacco processing. - Overgrazing due to livestock farming. - A high human population growth. - Pollution from fertilizers, herbicides and dynamites in fishing. - Human Settlement problems, Malnutrition diseases and environmental sanitation.

(3) MEASURES FOR SOLVING THE ABOVE ENVIRONMENTAL PROBLEMS

Ethiopia

- Legislation to control poaching.
- Reafforestation campaigns.
- Forestry and Wildlife Conservation.
- A comprehensive programme for public health improvement.

Kenya

- Reafforestation programmes mounted.
- Legal action against offenders.
- Reducing overgrazing and introducing high yielding species.
- Building of gabions.
- Construction of dams.
- Cultivation of cover crops.
- Irrigation.
- Contour ploughing.
- Efficient ways of insect pest control.
- Treatment of effluents to certain levels of safety before emission into water or soil.

Malawi

- Ministries of Agriculture, Natural Resources and Forestry and Health have programmes on Environmental issues intended to alleviate specific environmental problems.

Somalia

- The Government and some International Organizations have taken steps to limit cutting of forests for timber and charcoal.
- Make dams to stop water running off unnecessarily.
- Reserve grazing areas to be used by nomads.
- Stop exportation of timber and charcoal.

Tanzania

- Small scale irrigation projects.
- Cultivation of drought resistant crops.
- Building houses on individual farms to reduce human settlement congestion.
- Village afforestation programme - using improved, fast growing plant species.
- Introduction to conservation and environment management education.

(4) ENVIRONMENTAL EDUCATION TRENDS IN THE SUBREGION

a) All the countries represented at the Workshop pointed out that Environmental Education as a subject is not taught in primary and secondary schools. However, concepts of Environmental Education are incorporated in existing curricula in Kenya, Tanzania, Ethiopia, Malawi and Somalia.

b) (i) Environmental Education Trends in Ethiopia

Ethiopia has implemented the teaching of Environmental Education in primary, secondary and teacher training institutes. Elements of Environmental Education are incorporated in the various subjects such as Natural Science, Social Science and Home Economics.

The Ten Year Perspective Plan (TYPP) emphasizes that development, conservation and proper utilization of the country's natural resources i.e. land, soil, water, forests, wildlife and the environment have a decisive impact on the overall economic development of the country.

(ii) Environmental Education Trends in Kenya

Kenya has implemented Environmental Education Programmes at all three levels of formal education i.e. Primary, Secondary, Diploma Teacher Training Colleges and at the three Universities.

At the Diploma Teachers Colleges, Environmental Education courses are offered to all pre-service teacher trainees who would be able to incorporate Environmental Education concepts when teaching their main subjects at the secondary schools. Kenya Polytechnic, Nairobi has also started an Environmental Studies Course at the diploma level for secondary school leavers.

The Environmental Education Programme at Kenyatta University is offered at the postgraduate level to tutors of Diploma Colleges. On completion of their courses, these tutors would train pre-service teachers for secondary schools in Environmental Education. Efforts are being made at Kenyatta University so that Environmental Education courses are offered to all students at undergraduate and other postgraduate levels.

Moi University offers Environmental Education at the undergraduate and postgraduate levels to students majoring if Forestry, Wood Technology, Wildlife Management and other related courses. Environmental Studies are also offered at the University of Nairobi at postgraduate level in the different Departments with different emphasis relating to the type of postgraduate course being pursued by students.

(iii) Environmental Education Trends in Malawi

The Malawi National Conservation Strategy implies a wish by the government and the people of Malawi to conserve the nation's natural resources for the benefit of the people now and in the future. Following the recommendation of a National Workshop on the ^Importance of Environmental Education in the Development of Malawi^ (1983), which among other things called for a coordinated and intensified holistic approach to environmental matters, trends in Environmental Education are much more easily pronounced now than ever before as evidenced by the following measures:

a) The Ministry of Education and Culture is seriously intending to re-examine its Environmental Education programmes in schools and colleges with a view to strengthening them.

b) Having realized the lack of emphasis in the teaching of Environmental Education in the school system, the Ministries of Agriculture, Forestry and Natural Resources developed Environmental Units to try and bridge the gap.

c) There is (still in the pipeline) a proposed International Workshop to be organized at the Malawi Institute of Education on Environmental Education next year (1987) which will go a long way to promoting Environmental Education in Malawi.

There is no doubt therefore that Environmental Education trends in Malawi are gathering momentum.

(iv) Environmental Education Trends in Somalia

A few integrated curricula that will include Environmental Education as a subject to be taught in grades 5 to 8 of the Primary education level have been introduced during the 1986 - 87 school year. Two periods per week are given to Environmental Education, which is done both theoretically and practically. Resource materials are being produced in the form of texts and Teachers Guides for Environmental Education.

Environmental Education is not taught at the secondary school or college level. However, Environmental Education will be introduced progressively from primary onto secondary schools.

Teacher training materials for Environmental Education are being prepared for primary teachers colleges and will go onto secondary teachers colleges in due course. Extension workers have been placed to work along with schools and Regional Education Centres to start on-going projects in each school. The extension worker will assess the impact and appropriateness of the text materials as they are put into practice and give the feedback to curriculum developers at the Curriculum Development Centre.

(v) Environmental Education Trends in Tanzania

Tanzania has experience in Environmental Education in primary schools through environmental studies in Community Schools in MTUU Project (Tanzania UNICEF/UNESCO Primary Education Reform Project). Environmental studies incorporated skills and knowledge in history, geography, science, domestic science and agriculture in an integrated way. The knowledge skills learnt focused on tackling problems of Tanzania:
sanitation, food production, environmental conservation etc.

Recently, Agriculture as a subject has been re-introduced to take special care of environmental conservation and enrichment through proper utilization of the local environmental conditions to produce food and cash crops. Soil conservation measures, afforestation and ecological balance measures are some of the things being taught at the primary school level.

In secondary schools, Agriculture and Home Economics biases are not only instrumental in environmental conservation, but also safeguard the needs of students at local conditions. The subjects such as biology, geography, etc. have long incorporated concepts of Environmental Education in their curricula.

Teacher's colleges, like secondary schools, have been vocationalized into Agriculture and Home Economics, etc. These Institutions do courses that are useful in environmental conservation. Other advanced institutions of learning like in Agricultural Colleges, Wildlife Management College at Mweka and Agrovet Colleges have included in their curriculum many aspects of Environmental Education. The Sokoine University of Agriculture has Faculties of Agriculture, Veterinary Science, Forestry, Food Science and Technology etc. that have a heavy dose of Environmental Education in their curricula. The University of Dar es Salaam Department of Botany, Zoology and Geography have Environmental Education as a major component in their curricula.

Both at the Universities of Sokoine and Dar es Salaam, as well as Mweka College a lot of experiments and research work is being done as an attempt to find solutions to various problems of environmental degradation.

V PRESENTATION ON UNESCO-UNEP INTERNATIONAL ENVIRONMENTAL EDUCATION PROGRAMME (IEEP)

Dr. Abdul Ghafoor Ghaznawi, Programme Specialist in Environmental Education Unesco, Paris made the following presentation on the background and activities of IEEP.

Background

As far as the background of IEEP is concerned, Dr. Ghafoor Ghaznawi, said that the declaration of the United Nations Conference on Human Environment organised in Stockholm, Sweden, 1972, proclaimed: "To defend and improve the Environment for present and future generations has become an imperative goal for mankind". Furthermore, recommendation 96 of the same conference stated that, "the Secretary - General, the organizations of the United Nations System especially the United Nations Educational, Scientific and Cultural Organization (Unesco), and the other international agencies concerned, should, after consultation and agreement, take the necessary steps to establish an international programme in Environmental Education, interdisciplinary in approach, in school and out of school encompassing all levels of education and directed towards the general public, in particular the ordinary citizen living in rural and urban areas, youth and adults alike, with a view to educating him so as to know the simple steps he might take, within his means, to manage and control his environment".

Thus, the international need and mandate for the development of Environmental Education. Responding to the above, Unesco and UNEP launched in 1975 the Unesco - UNEP. International Environmental Education Programme (IEE).

Objectives of IEEP

The current objectives of IEEP are to promote the implementation of the recommendations of the Tbilisi Intergovernmental Conference on Environmental Education (1977) through encouraging and assisting governments, national, regional and international institutions to incorporate environmental education into formal and non-formal education systems and

programmes in order to make people aware of the nature of the relationship between man and the environment on which he depends; impart knowledge and skills to understand and solve environment and development - related problems; and enable people to acquire the attitudes and motivations leading to sound decisions and actions for the protection and improvement of the environment and its quality.

In this context, Dr. Ghafoor Ghaznawi added that the emphasis of IEEP's current activities is on;

(i) the incorporation of Environmental Education into the teaching/learning processes at primary and secondary schools, pre-service and in-service teacher education, university general education, technical and vocational education and non-formal education.

(ii) local adaptation and use of Environmental Education materials and documents developed under IEEP; and

(iii) fostering international cooperation in this field.

Activities of IEEP

As far as the activities of Unesco-UNEP International Environmental Education Programme are concerned, they are undertaken at International, regional, subregional and national levels grouped under exchange of Information, Development of Environmental Education goals, Objectives, Guiding Principles and concepts; Research and Experimentation, Training of Personnel, and International cooperation.

1. Exchange of Information

This involves publication and dissemination of the quarterly newsletter Connect, in five languages, to about 13,000 professionals and institutions. Directories on institutions and Environmental Education programmes and glossary of Environmental Education terms have been prepared and disseminated. Documents such as Trends in Environmental Education, numerous reports of Environmental Education meetings organised under IEEP, copies of Environmental Education documents prepared in the Environmental Education series of IEEP have been distributed free of charge to interested institutions and professionals.

Resume's of country reports are reflected in Connect for informing a wider audience on the development of Environmental education in the participating member states. A network of institutions active in Environmental Education development is being constituted.

2. Development of Environmental Education Goals, Objectives, Guiding Principles and Concepts

To achieve the above IEEP has prepared and organized an international Workshop on Environmental Education in 1975 in Belgrade, Regional Expert Meetings in Africa, Asia, Latin America and the Carribean, Arab States and Europe during 1976-1977 and the Intergovernmental Conference on Environmental Education Tbilisi, USSR, October 1977. A concrete outcome which could be considered a landmark in the development of Environmental Education in the 70's was the formulation of Environmental Education goals, objectives and guiding principles which have served as a common denominator in the development of numerous international activities in Environmental Education.

3. Research and Experimentation

With respect to the above, it was mentioned that the IEEP has undertaken an international survey of Environmental Education needs and priorities; surveys on curriculum

development and teacher training in Environmental Education, survey and studies on the incorporation of Environmental Education into University general education; studies on the development of guidlines for the incorporation of Environmental Education into non-formal education and into technical and vocational education. IEEP has supported 31 pilot, experimental and research projects in formal and non-formal Environmental Education. In Africa, pilot projects supported and implemented are in Kenya, Burkina Faso, Senegal and Mali.

4. Training of Personnel in Environmental Education

Dr. Ghafoor Ghaznawi added that the training of personnel in Environmental Education was identified as a priority need in the International Survey of Environmental Education Needs and Priority done in 86 Member States in 1976. The intergovernmental Conference on Environmental Education in Tbilisi (1977) emphasized and elaborated the training of personnel through Recommendations 17 and 18 addressed to Member States.

The Conference further recommended to Unesco to promote the dissemination of ideas, programmes and instructional material relevant to the promotion of in-service training of Environmental Education.

IEEP's training of personnel in Environmental Education has focused on the following:-

(a) to orient key education personnel towards Environmental Education philosophy, goals, objectives, guiding principles and strategies for its development. In this context, it was pointed out that IEEP has organized one international training course, 5 regional and 5 subregional training seminars as well as 37 national seminars in Africa, Asia, Arab States, Latin America and the Caribbean and Europe.

(b) to prepare Environmental Education training materials. The two documents on strategies for curriculum development and teacher training in Environmental Education and six teacher

training modules which are serving as working documents of this Workshop, were prepared in collaboration with teams of educators from:

(i) Universities of Wisconsin and Illinois, U.S.A.

(ii) The School of Education of the University of West Indies in Jamaica and the Curriculum Department of the Ministry of Education of Jamaica.

(iii) The Science Centre of the University of the Phillippines;

(iv) Faculty of Education of Monash University and the South Australia College of Advanced Education, Australia.

(v) National Council of Education Research and Training, New Delhi, India and

(vi) Kenya Science Teachers College, Nairobi, Kenya.

(c) to involve national education institutions in Environmental Education training.

- All of IEEP training activities at international, regional and subregional levels have been implemented in institutions with potentialities and promises to serve in the long run as centres of excellence in Environmental Education.

(d) to enhance networking in Environmental Education through distribution of training documents and reports to participants of IEEP's training activities.

(e) International Co-operation

Most of the activities implemented by IEEP have an international co-operation dimension. Specifically, international co-operation has been enhanced through funding advisory missions concerning Environmental Education training activities, curriculum development and pilot projects. Similarly, nice Environmental Education regional and international meetings and conferences organized by Government and non-governmental organizations have been supported by IEEP.

V. STRATEGIES FOR CURRICULUM DEVELOPMENT AND TEACHER TRAINING IN ENVIRONMENTAL EDUCATION

A. Strategies for Developing an Environmental Education Curriculum, Unesco-UNEP IEEP, 1980

Mr. B. O. K'Omudho, Head of Environmental Education/ Information Section, National Environmental Secretariat, Nairobi, prepared the resume' of and a discussion guide on the above document and presented them at the workshop. He aslo led the discussion on the document. The resume', discussion guide, and conclusions of the plenary sessions and working groups on the above document are as follows:

1. RESUME'

The Definition

As adopted at the World Intergovernmental Conference on Environmental Education held in Tbilisi, USSR 1977, Environmental Education can be defined as:

..... a process aimed at developing a world population that is aware of, and concerned about the total environment and its associated problems, and which has the knowledge, attitudes motivations, commitments and skills to work individually and collectively toward solutions of current problems and the prevention of new ones.

The goal of Environmental Education lays emphasis on Process Method where citizens must be trained who can and will apply problem solving skills to the remedy of those problems we face today, and to the planning necessary to avoid environmental problems of the future. EE curricula should therefore provide opportunities to improve skills in carrying out investigations e.g. by observing, comparing, classifying, quantifying, measuring, experience, inferring, predicting etc.

Patterns in Environmental Education

Environmental Education (EE) as an entity with the same name is of fairly recent origin. Its roots however extend back to that moment when man first envisioned an interrelationship between himself and the biosphere which resulted in an evolution of his role in the maintenance or deterioration of that environment.

The traditional system of education had always contained aspects of environmental education though it failed to generate an awareness on the importance of safeguarding the environment. Mainly this has been due to lack of a systematic treatment of environmental concepts in an interdisciplinary or multidisciplinary approach in different subject areas. The teachers had limited awareness and knowledge on the environment as they had received inadequate training in this field as well.

The critical need for Environmental Education became recognized since the Stockholm Conference in 1972 which declared that:

"Environmental Education is a vital tool for promoting new perceptions to guide patterns of behaviour between man and his environment".

A number of regional and world conferences were held, each contributing to a philosophy and a body of knowledge concerning world needs and a perspective of EE. Those meetings led eventually to the world's first Intergovernmental Conference on Environmental Education organised by Unesco in co-operation with UNEP. This Conference was convened in Tbilisi Georgia (USSR) in October, 1977 which resulted in a Declaration and 41 Recommendations for the development of EE.

Guidelines for Designing Environmental Education Curriculum

Format:

There are two conceptual models of EE Curriculum:

a) Interdisciplinary (single subject) model in which relevant components of many disciplines are drawn upon to create a distinct EE Unit, course or module.

b) Multidisciplinary (infusion) model - involves infusion of EE components into other established disciplines where appropriate.

Guidelines for the Acquisition and Transfer of Knowledge and Skills

The production of environmentally literate citizens through formal education implies that knowledge, cognitive skills and attitudes not only be acquired in the classroom but also that these be transferred to the decision-making processes of the receivers throughout their lives. Transfer of knowledge and skills is more likely to take place:

i) when students have experience with a diversity of problems. Exposure to a wide range of problems helps to develop an expectancy that each problem will have to be solved in a somewhat different way.

ii) when students learn to apply principles in situations with distracting and irrelevant elements. This is necessary if the student is to learn to discriminate between relevant and irrelevant features of situations so that the principles involved may be identified and accurately applied.

iii) when opportunities are provided for the pupil to learn and use knowledge in a variety of situations. This is based on research findings that acquired knowledge tends to be most used in the situation in which it was acquired.

The guiding principles for EE, as outlined by the Tbilisi Intergovernmental Conference on Environmental Education reflect a definite need for both the acquisition and transfer of learning in environmental education. Programme developers should strive to reflect these guiding principles in any curriculum development project, making certain that the need for both acquisition and transfer is met. These guiding principles follow:

Environmental Education should:

- consider the environment in its totality, natural and built, technological and social (economic, political cultural, historical, moral, aesthetic);

- be a continuous life long process, beginning at the pre-school level and continuing through all formal and non-formal stages;
- be interdisciplinary/multidisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective;
- examine major environmental issues from local, national, regional and international points of view so that students receive insights into environmental conditions in other geographical areas;
- focus on current and potential environmental situations and international co-operation in the prevention and solutions of environmental problems;
- explicitly consider environmental aspects in plans for development and growth;
- enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;
- relate environmental sensitivity, knowledge, problem-solving skills and values clarification to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years;
- help learners discover the symptoms and real causes of environmental problems;
- emphasize the complexity of environmental problems and thus the need to develop thinking and problem-solving skills;
- utilize diverse learning environments and broad array of educational approaches to teaching/learning about, from and in the environment with due stress on practical activities and first-hand experience.

Criteria for Decision-making in Environmental Curriculum Development:

The environmental curriculum is the sum total of all the experiences learners have under the auspices of the school that relate to the knowledge, skills, attitudes, and human behaviour

associated with the acquisition of an environmentally - appropriate life style.

The definition of the environmental curriculum stated above implies far more than the preparation of documents intended for use in the classroom of a school or a nation. It implies - additionally - the responsibility of curriculum developers to prepare curricula that will stimulate learning of conceptual knowledge, provide for the attainment of problem-solving skills, allow for the alteration of value constructs and provide for training in and opportunities to apply appropriate citizenship behaviours. Therefore the entire process of curriculum development involves far more than the preparation of materials. Involved in this process would be:

(i) decision-making concerning goals and objectives;
(ii) subject matter to be used to meet the desired goals and objectives;
(iii) the organisation of that subject matter;
(iv) methods to be used in teaching the subject matter;
(v) the evaluation of the extent to which the content and methods meet the desired goals and objectives.

Goals and Objectives of Environmental Education:

Goals: - to foster clear awareness of, and concern about, economic, social and ecological interdependence in urban and rural areas;

- to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment;

- to create new patterns of behaviour of individuals, groups and society as a whole towards the environment.

Objective Categories:

Awareness to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.

Knowledge	to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of the environment and its associated problems.
Attitudes	to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.
Skills	to help social groups and individuals acquire the skills for identifying and solving environmental problems.
Participation	to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolutions of environmental problems.

Procedural Guidelines and Considerations for Curriculum Development

It is the purpose of this section to identify and discuss some specific steps in the development of curriculum in EE. Obviously, the process will have to be modified to fit the specific needs of each school's, region's, or nation's unique educational situation.

Phase 1:

- Establish a committee to develop, implement and evaluate the Environmental Education programme.
- The Environmental Education committee should include administrators, teachers from various grade levels, local officials, parents, and citizens representing various community interests. An Environmental Education co-ordinator or 'facilitator' should be appointed to provide the leadership and guidance essential to the success of the programme.

Phase 2:

- Establish Environmental Education goals that the environmental education programme will be designed to strive toward:

Goal Statement:

To develop a citizenry that is aware of and concerned about, the total environment, and its associated problems, and which has the knowledge, attitudes, motivations, commitments and skills to work individually and collectively towards solutions of current problems and the prevention of new ones.

Phase 3:

- Establish Environmental Education objectives that the programme will be designed to achieve.

Bloom's Taxonomy of Education objectives may be applied in stating the objectives to include cognitive, affective and psychomotor domains.

The objective categories as mentioned earlier include: awareness, knowledge, attitude, skills and participation.

Phase 4:

- Review the literature regarding theories of learning and instruction and attitude and behavioural change to serve as guiding principles in the formulation, implementation and evaluation of the Environmental Education programme.

Phase 5:

- Establish guiding principles of environmental education to help achieve stated Environmental goals and objectives.

Curriculum programmes should be planned horizontally as well as vertically. The various subjects should not be studied in isolation. They should be planned so that students can utilize the contributions of inter-disciplinary/multidisciplinary studies in understanding and solving environmental problems.

Furthermore, a curriculum programme should recognize individual differences. No sequence meets the needs of all students. Therefore, a curriculum should be flexible so that material can

be presented according to the background, needs and aspirations of the students.

The guiding principles of Environmental Education that educational institutions could consider are those mentioned earlier or similar ones.

Phase 6:

- Establish the curriculum (instructional model) or the Environmental Education Programme.

  An action oriented model may consist of the following integral parts:

Part A: Philosophy and concepts (Big Ideas).

An Environmental Education Programme should be directed toward assisting the learner to fully understand certain concepts (Big Ideas) and supportive understanding important to the development of an environmentally literate citizenry.

Give major environmental education concepts basic to this philosophy which are: ecosystem, population, economics and technology, environmental decisions and environmental ethics.

Part B: Skill Development:

To produce an environmentally literate and active citizenry, it is, essential to assist the learner in obtaining skills to help resolve environmental knowledge and a motivating concern. Problem-solving skills are essential to developing and carrying out environmental action plans.

Some of the skills are the ability to:

1. recognize environmental problems;
2. define environmental problems;
3. listen with comprehension;
4. collect information;
5. organize information;

6. analyse information;
7. generate alternative solutions;
8. select a solution;
9. develop a plan of action;
10. implement a plan of action and
11. evaluate the plan of action.

Part C: Values Clarification:

In order to solve environmental problems, it is essential that we get the root causes, such as the lifestyle of each individual. A student picking up litter would be treating a symptom. Developing the concern to change a person's behaviour patterns that causes him to drop the litter would focus on the root causes. Each learner needs to be guided through a valuing process where he/she explores the consequences of one's individual action, and where he/she learns to generate ideas for alternative behaviours that would bring him /her into a more compatible way of living with his/her environment.

Part D: The Environmental Encounter:

When studying the environment, it is imperative that the learner has direct experience with the environment. This is designed to assist the learner in the integration of concepts, problem solving skills and values. The learner should have the opportunity to become personally involved in positive action.

Part E: Emphasis of Programme at Different Age Levels

For effective teaching/learning situations in the classroom, an understanding of how children develop intellectually and also how children learn is necessary. Jean Piaget has developed a theory of intellectual development in children. According to him children develop intellectually in a sequence of stages by age. Each stage of learning is necessary for the development of the stages that follow.

A child cannot skip a stage because each stage not only utilizes and integrates the one before it but also serves to pave way for the one that follows it. The sequence of stages is the same for all children but the rate at which particular children pass through these stages will depend upon the children's heredity and their socio-economic environment. These stages are as follows:

(i) Sensory - Motor State (birth to 2 years).
(ii) Pre-operational Stage (2 to 7 years).
(iii) Concrete Operations Stage (7 to 11 years).
(iv) Formal Operations Stage (11 to 14 years).

Environmental Education activities at each level should focus on the affective (feelings), cognitive (knowing) and skill - behaviour domains (skills). Emphasis in the early years, however, should be on the affective domain and in the later years on the cognitive and skill behaviour domain.

Part F: Teaching Learning Models

There is no single teaching model that all learners will respond favourably towards under all circumstances. It is important for a teacher to assess his/her personal teaching skills and the situation and then blend teaching models in an effort to achieve the best learning environment.

The role of the teacher is to create a learning environment, assist learners in acquiring information, provide guidance to the learner and to participate with the learner in the learning process.

Part G: Pre-testing the Programme

Once a model has been developed and is ready for implementation, one of the first steps might be to develop an evaluative instrument to pre-test the students in the pilot school and in a control school in an effort to obtain baseline data prior to the launching of the programme. The research should also include reactions and suggestions from students, teachers, principals and parents. The results of the evaluation should be reviewed and recommendations made prior to enlarging the programme.

Phase 7: Establish a comprehensive in-service education.

Programme for staff development.

The infusion of an effective EE curriculum into existing school programmes will necessitate that teachers themselves possess the knowledge, skills and affective attributes they are expected to impart to students. They must not only acquire these attributes, but do so in a manner that encourages them to transfer EE knowledge, skills and attitudes to their teaching methods. Classroom teachers should experience training in curricula based on the same criteria as EE curricula they are expected to teach.

It is important to include teachers and administrators in the development of an in-service teacher education programme.

A series of teacher-learner workshops should be offered to discuss and produce written guidelines and materials designed to assist teachers in implementing the goals and objectives of the environmental education programmes.

Phase 8: Develop a reinforcing learning environment

It is imperative to keep in mind that to change an individual's beliefs, attitudes, values, and behavioural patterns often requires a very strong and reinforcing learning environment (school programmes, youth programmes, church programmes, television and radio, newspapers and magazines ariticles, environmental books, tours etc.) For this reason, it is vital that the committee works with all components of the community to identify ways that each component can assist the school system in achieving its stated EE goals and objectives.

Phase 9: Strategy to overcome programme constraints

To help overcome constraints against full implementation of an Environmental Education programme, it is important that the Environmental Education committee identify problems (constraints) that need to be overcome for the EE programme to be fully successful.

Phase 10: Develop instruments to evaluate the effectiveness of the EE Programme

Environmental Education programmes should be evaluated periodically to determine if the stated objectives of the programme are being achieved. The results of the evaluation should be fed back so that the programme can be modified to reflect information derived from the evaluative instruments.

It is important that the evaluation instruments be as objective, reliable and valid as humanly possible.

DISCUSSION GUIDE

- At what levels of Education are the two models of Environmental Education most appropriate?
  (a) Interdisciplinary (single subject) model?
  (b) Multidisciplinary (infusion) model?
- Can Environmental components be injected in every school subject? How?
- How best do you think the greatest degree of environmental awareness could be tapped in schools and colleges?
- How can a small department/faculty in an institution go about developing a curriculum?
- What are the merits and demerits of curriculum developed at a centre and sent out to teachers in the field to implement before any in-service courses?
- To what extent do our terminal examinations attempt to focus on the goal and objectives of our Environmental Education programmes?

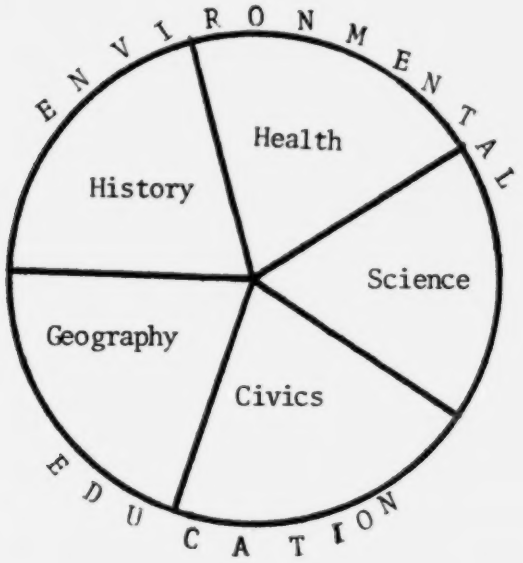
DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS:

Interdisciplinary (single subject) model is the most appropriate way of introducing Environmental Education at tertiary level i.e. college or university level. The multidisciplinary

(infusion) model is most appropriate at all levels of education systems, be it primary, college or university. The two models of curriculum development for Environmental Education should complement each other at various levels of the system.

The format of the curriculum should be such that it enables Environemntal Education to be both inter-disciplinary and multidisciplinary depending on the level at which it is being applied.

The Malaysian Model of Environmental Education was found to be another possibility. In this model Environmental Education at grades 4, 5 and 6 is considered as a whole and some of the disciplines come in as illustrated below:



In the development of Environmental Education a core Committee should be formed to look into possibilities and feasibilities of incorporating Environmental Education in the curriculum. The leadership of such a committee should be ready to accommodate all the applicable suggestions. If there is an education reform, a mandate should be got from the government to facilitate/enable implementation of the recommendations to introduce Environmental Education in the existing curriculum.

At the moment most of the curriculum committees formed consist of members who are not always available when important issues are being discussed. There is need for more permanent members to be on the committee formed so that their work is done much faster and continuously.

These committees should be made up of members from different institutions. An example of Kenya was given which illustrates the role of each institution represented as shown below: Curriculum development, is the responsibility of the Kenya Institute of Education (KIE), implementation is the responsibility of the Inspectorate and evaluation is the responsibility of the Kenya National Examinations Council (KNEC).

Modules for both pre-service and in-service courses should be produced in Environmental Education. Adult Education programmes should incorporate concepts of Environmental Education. Different Non-Governmental Organisations (NGOs) should be encouraged as they have an important role to play in Environmental Education activities. The activities of different NGOs cater for the large number of school drop-outs.

Research findings have shown that Environmental Education has emphasized the affective domain at the lower level, cognitive domain at the middle level and ethical, moral and ecological considerations at the secondary level.

A core committee, composed of more permanent and easily available members, should be formed in a country to oversee the incorporation of Environmental Education in the existing curriculum. The committee would decide whether the interdisciplinary or multidisciplinary introduction of Environmental Education is the best approach at the different levels of the country's education system.

Resource material in the form of text books are not readily available but teachers can organize themselves to write instructional materials such as hand-outs. They could also obtain resource materials from the local dailies and organizations such as UNEP and Unesco.

A general Environmental Education course should be taken by all undergraduates at the university level.

B. STRATEGIES FOR THE TRAINING OF TEACHERS IN ENVIRONMENTAL EDUCATION, Unesco - UNEP IEEP, 1980

Mr. P. W. Munga, Principal, Kenya Science Teachers' College, Nairobi, prepared the resume' of and a discussion guide on the above document. He presented the document and led a discussion on it at the Workshop. The resume', discussion guide and conclusions of the plenary sessions and the working groups on the above document are the following:

1. RESUME'

The need for global as well as regional or national awareness of Environmental problems and how to solve them is unquestionable. It is true to state that implementation of Environmental Education programmes has been sporadically carried out here and there. What is needed as stipulated in various conferences and workshops particularly mentioned by the 1972 Stockholm Conference is "an organised implementation of Environmental Education Programme".

The rationale behind our great need to understand our environment is the universal acceptance that our environment is ever changing and that man is one of the greatest forces in influencing that change. For example we know that man needs more land (Ref. to Polders of Nertherlands) that we need more trees (Ref. Charcoal Story in Kenya) more fish, more oil, more minerals, more food, more livestock. Some of these needs will create negative direct or indirect effects on the environment.

The philosophy and also the need for Environmental Education have been well covered by the:

1. 1972 Stockholm Conference.
2. 1975 Belgrade Workshop.
3. 1977 Tbilisi Conference.

In the 1980 UNESCO Publication by Dr. Richard J. Wilke etc. on "Strategies for the Training of Teachers in Environmental Education", it is stated that for effective development of Environmental Education one must,at the national level,develop relevant curriculum in Environmental Education and equip the teachers with the required competencies for its teaching during their training.

In the 1980 report referred to above, Dr. J. Wilke indicated the good responses (82%) from UNESCO Member States on the need for Environmental Education, 71% of the States rated the need as high and 81% showed at the world level the need for training personnel for environmental education activities. He has gone on to state that efforts towards training have been negligible, quoting from "Education and Challege of Environmental Problems" - UNESCO 1977 - he agrees that "relatively few efforts have been made in any of the regions to supplement the traditional training of teachers, organisers of traditional activities and educational administrators with a view to producing competent staff for Environmental Education."

He argues that the basic problem is the traditional training by discipline. Most teachers are not familiar or exposed to the vital inter-disciplinary approach and do not apply such educational ideas as student participations, research, experimentation, excursions, project work etc. The report goes on to report that the poor response to Environmental Education is to be found in Developed as well as the Developing countries. In U.S.A. it was established that less than 10% of the teachers had received in-service or pre-service training in Environmental Education.

If Environmental Education has to be effectively taught then we must seriously apply the Tbilisi Conference Recommendations No. 17 and No. 18 enumerated here below:

- environmental sciences and environmental education be included in curricula for preservice teacher education:
- the staffs of teacher education institutions be assisted in this respect;
- teachers should get environmental training relating to the area, either urban or rural, where they are going to work;
- they take necessary steps to make inservice training of teachers in environmental education available for all who need it;
- the implementation and development of inservice training, including practical training, in environmental education be made in close cooperation with professional organizations of teachers, both at the international and national levels;

- inservice training take account of the area, either urban or rural, where teachers are working;
- education and training institutions should have the necessary flexibility to enable them to include appropriate aspects of environmental education within existing curricula and to create new environmental curricula that meet the requirements of an interdisciplinary approach and methodology;
- teachers and learners should be involved in the preparation and adaptation of instructional materials for environmental education;
- teachers in training should be given an understanding of as wide a range as possible of educational materials and aids, with special reference to low-cost materials and opportunities for adaptation.

To implement the above recommendations, Governments, education administrators, teachers and interested bodies like UNESCO, UNEP will have to show total commitment - at least to start the ball rolling and before the multiplier effect is felt in our educational systems. In 1975 the State University in Illinois organized a comprehensive Environmental Education leadership development project. Its objectives could form the basis of any other workshop and are produced in summary here-below:

1. To demonstrate conceptual and practical knowledge on natural and man-influenced environment.
2. To describe and analyse contemporary scientific and social environmental problems; their principles and relationships.
3. To utilize problem solving and decision making techniques.
4. To define value positions of current environmental issues.
5. To assess quality of available Environmental Education instructional materials.
6. To demonstrate techniques of organising and implementing instruction using the environment.
7. To demonstrate ability to formulate a generalized plan for infusion of Environmental Education in the curriculum.
8. To utilize processes for initiating, implementing and evaluating changes in instructional programmes.

These objectives are quite comprehensive and whenever in-service is contemplated the objectives could be adjusted/amended to match the needs of in-service training programmes. Each country can design its own approach to such seminars but the central role of creating the need, exposure, awareness, acceptance as well as transmitting basic philosophy and skills should be emphasised all along.

Proposal for Environmental Education Implementation and Teacher Training:

In making the proposal it is assumed that Environmental Education is accepted for a National Curriculum.

1. We must be ready to train resource persons at primary and secondary level. These people should in-service our teachers at primary and secondary levels during the holidays.
2. We must provide study programmes for our teacher-trainers into universities offering Environmental Education as a degree.
3. We must provide for Environmental Education in our pre-service Teacher Training Curriculum.
4. We must provide for a long term supply for Environmental Education teachers by offering Environmental Education as a subject in post-primary teacher training institutions.
5. We must facilitate a flexible curriculum and time tables for Environmental Education to be incorporated.
6. We must ensure that Environmental Education receive positive philosophical/psychological support from teachers, heads of institutions and education administrators.
7. We must organize seminars and workshops to produce relevant resource materials and wherever possible be exposed to new ideas/approaches at national, regional and world levels.

In conclusion it is felt that Environmental Education is a vital component of the curriculum. We need however, to give the right emphasis and develop the right approach to the subject. We have a duty therefore to train our society in general but our teachers in particular through well organized in-service or pre-service workshops and seminars. Kenya Science Teachers' College in general and Environmental Science Department in particular feel honoured to be associated with this workshop. As a Science College, Kenya Science Teachers' College has taken the lead by having an

Environmental Science/Education Department which exposes all students to environmental issues. The College can easily expand its role to train teachers for Environmental Education if its tutors are exposed to further studies on Environmental Education.

It is hoped that UNESCO will succeed through such workshops as this one to get more countries to accept Environmental Education as an essential component at all levels of their education systems.

DISCUSSION GUIDE

- Is awareness the major issue in exposing teachers to Environmental Education?
- What methodologies can we employ for teacher trainers and teacher trainees?
- We do not need "pre-service training" for Environmental Education teachers, in-service of regular staff is satisfactory. What is your view?
- The major hurdle in training teachers in Environmental Education is lack of funds. How relevant is this statement in as far as your country is concerned?
- Why have the countries made little progress in implementing Environmental Education curriculum in Education Institutions?

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

Workshop participants agreed that awareness is the major issue but this should be backed by policy guidelines and statements from higher authorities. Awareness is important to sensitise people about environmental conservation and protection.

Members suggested that the attention of the various target groups should be drawn to the following components:

- the existence of Environmental Education dimension.
- the rationale, philosophy, objectives and strategies of Environmental Education.
- the existence of co-operating organizations.
- the existence of a collection of literature and audio-visual teaching materials.

Ways and means of stimulating awareness include:

- use of mass media eg. press, radio etc.
- communication with heads of institutions.
- make effective use of opinion leaders and leaders and professionals in society in sensitizing the masses about the environment.
- conduct in-service seminars for teachers.
- introduce Environmental Education components in other disciplines.

Participants identified the following training levels:

- personal induction.
- In-service courses.
- Pre-service courses.
- Seminars/workshops and conferences.

Each of the above training levels will have its own combination of methodologies and the following methodologies were recommended:

- Lectures.
- Discussions.
- Exposure/experiences.
- Collection of available materials/literature.
- Excursions/ or observations.
- Identification of problem-solving techniques.

Participants recognized that Environmental Education, though an age long concept, has only recently been formalized. Therefore we need both pre-service and in-service training in order to increase manpower for the implementation of Environmental Education in schools.

Environmental Education should be incorporated in school curriculum and incremental incentives should be considered over a long period of time.

Countries in the sub-region have recognized the fact that lack of funds can be a major problem in the training of teachers in Environmental Education. However as an attempt to alleviate this problem is to infuse Environmental Education in the on going in-service and pre-service teacher training programmes which may not require huge additional funds. For the training of the educational personnel such as curriculum developers, teacher trainers inspectors and educational planners in environmental education through national and subregional seminars, Unesco may be requested for technical and financial support or if funds are forthcoming from anywhere, they should be greatly welcome.

Consideration should be made to allocate some funds in education budget in order to introduce Environmental Education into teacher training programmes for formal and non-formal education.

Efforts should be made to use cost effective methods of conducting Environmental Education courses in order to spread awareness about the environment to students, teachers and the prublic.

VI. TRAINING OF PRIMARY SCHOOL TEACHERS AND SUPERVISORS IN ENVIRONMENTAL EDUCATION

A. ENVIRONMENTAL EDUCATION: MODULE FOR PRE-SERVICE TRAINING OF TEACHERS AND SUPERVISORS FOR PRIMARY SCHOOLS, UNESCO-UNEP IEEP, 1983 (EE SERVICE NO. 5)

Mr. P. H. Ogula, Curriculum Developer, Kenya Institute of Education, Ministry of Education, Science and Technology Kenya prepared the resume' of and a discussion guide on the above document and presented them at the workshop. He led the discussions of the plenary session on the above document as well. The resume', discussion guide and conclusions of the working groups and the plenary sessions are as follows:

RESUME'

OBJECTIVES AND STRUCTURE

The module focuses on the pre-service preparation of primary school teachers and primary school inspectors. Its main objectives are to:

a) foster the acquisition and transfer of knowledge, skills and attitudes concerning the environment and its problems.
b) enable teachers to effectively teach environmental education at the primary school level.
c) develop competence in the supervision of environmental education in primary schools.

STRUCTURE

The module has two main sections. Section one deals with the content of environmental education, while section two is concerned with the methodology for environmental education. It is hoped that at the end of the course, pre-service teachers will not only have understood the environment and its allied problems, but will also be able to teach environmental education at the primary school level using a variety of teaching-learning strategies and evaluation procedures.

THE ENVIRONMENT

The environment includes living and non-living objects as well as interactions between them as the following:-

1. The Biophysical Components:
   (i) Physical components of the environment. These include:
   - Climatic factors- namely, light, temperature, precipitation and wind.
   - Physiographic factors: altitude, steepness of slope, weathering and erosive agents and nature of the underlying rock of an area.
   - Edaphic of Soil factors.

   (ii) - Biological components.
   These comprise all living organisms: plants, animals, bacteria, viruses. They all tend to live in environments for which they have been adapted.

   For example, fish live in open water, sea anemones live in the sand etc.
   Although man has the ability to manipulate many factors in the environment, he is also adapted to his environment.

2. Ecosystem interrelationship.

   The most basic unit of a biosystem is the ecosystem. In a natural system there is interaction involving food, energy and inorganic nutrients. All the ecosystems involve:
   - Food Chains.
   - Energy content pyramid.
   - Pyramid of numbers.
   - Cycle of nutrients e.g. Phosporus and Nitrogen cycles.

   Food Chains are of two types:-
   (i) Grazing chain - begins from a green plant base to herbivores then to carnivores.
   (ii) Detritus Chains -begins with dead organic matter, which release material for the use of micro-organisms; these are consumed by detritus feeders which are, in turn deveared by predators.

3. The Socio-cultural components.

   Every individual is engaged in social, political, economic and other interactions with other individuals. These interactions

vary from group to group and depend on the type of institutions that exist and man's attempts to satisfy his basic needs. Some of man's common activities are food getting, building houses, developing technology, maintaining good health, establishing morals and values, setting up political institutions, recreation, communication and transport, making clothing etc.

4. Interactions between the biophysical and socio-cultural components.
Man continuously influences his physical and biological environments and he is in turn influenced by them. For example, some plants and animals are used as sources of food, water is used mainly for domestic purposes, minerals are used as metals, solar energy is used for heating houses etc.

ENVIRONMENTAL PROBLEMS

Problems associated with the environment are man-induced but some of them are natural. Naturally occurring problems include earthquakes, tropical cyclones, volcanoes etc.

Man-induced problems arise out of man's manipulation of the environment to satisfy his way of life.

1. Problems associated with food production.
   a) Planned extensive cultivation has virtually used up the world's arable land.
   b) Over-hunting for food has led to the extermination of many species.

Several strategies have been employed to increase food production, but they all affect the environment: selective breeding, fertilizing, pest control irrigation, and mechanization.

2. Problems associated with the use of water.
Attempts to provide more water for man's use leads to an interruption of the water cycle. This generates ecological, economical and social costs. For example, transferring large quantities of water from its normal course may have direct consequences for the world's climate as it would affect the atmospheric circulation of water vapour.

3. Problems associated with use of minerals and energy.

   Environmental problems created by mining operations include pollution of the air by dust from ores and coal, oil spills at sea with their consequences on marine life etc.

4. Urbanization.

   Urban and industrial areas consume a disproportionate quantity of available resources like food, water, energy and oxygen. They also contribute to water and air pollution.

Dealing with Environmental Problems:

Environmental problems need urgent solutions. These solutions require intense study and understanding of environmental issues and a change of attitude by man. Man should be prepared to understand the consequences of his uncontrolled use of the environment so that he can use it wisely, and also conserve it. Some guiding principles for finding solutions to environmental problems and their application to some problem areas are contained on pages 88 to 107 of the Module (EE Series No. 5).

Strategies for Including EE in Curriculum for Primary Teacher Training

The most common approach to environmental education is the interdisciplinary approach. Three methods may be applied in the organization of the environmental education curriculum at the primary teacher's college level.

1. The Infusion Method

   Environmental education can be implemented by including relevant concepts in certain academic disciplines. Several of the most important of these disciplines and their relevance to environmental education are discussed below:

   (i) General Science:

   The subject matter of General Science is closely related to that of environmental education. The course should not only consist of the physical and biological components of the environment but also of problems arising from interactions in the environment and strategies for dealing with them.

In addition, the scientific approach to investigation should be used.

(ii) Social Science (Geography, History, Civics, etc.)

In some countries Geography, History, Civics and other social Science disciplines are taught as an interdisciplinary course at the primary school and primary teachers' training levels. There are good arguments for including some aspects of environmental education in an interdisciplinary Social Studies curriculum.

(iii) Literature and language.

Literature is one way of passing on the cultural heritage from one generation to many other that come after it. In it are contained the tales, myths and stories which express the thoughts and feelings of mankind towards social and physical environment.

(iv) Art and Craft.

Through artistic observation and expression of nature, the teacher can build a deep appreciation of the beauty of the physical surroundings.

2. Applied learnings.

This method uses a thematic approach. It is interdisciplinary in approach and requires the co-operation of several subject lecturers.

3. The holistic method.

This approach organises instruction around fundamental environmental education questions, topics and problems. It can be used to study a defined physical area such as a home, town, district, or country. The model is illustrated on page 177 of the Module (EE series No. 5)

PEDAGOGICAL APPROACHES

Environmental education should be designed to help learners acquire:

(i) an awareness of the environment.

(ii) an understanding of the environment based on knowledge about it.

(iii) a concerned attitude towards the environment.
(iv) an ability to use the knowledge purposefully.

In teaching environmental education, lecturers should use learner centred approaches such as project work, field trips, simulation, games, group discussions, debates, experiments and role playing. Some of these methods are illustrated on page 136 to 161 (EE Series No. 5).

Evaluation of Environmental Education

Evaluation has been defined as the process of determining the extent to which the objectives of a programme are being realized. The main function of evaluation is to provide the teacher with information concerning the individual's knowledge, skills and attitudes.

Within the classroom evaluation includes teacher made tests, direct observation of pupils, questionnaires and attitude scales, check list, interviews by teachers and specialists assessment of projects and rating scales.

It cannot be emphasized too strongly that the teacher should make efforts to evaluate attitude change and acquisition of skills in Environmental Education.

Management of EE in the Primary Classroom

At the primary school level environmental education should be taught as part of relevant academic disciplines such as General Science, Agriculture, Geography, History and Civics, Religious Education and Language. The child should be made aware of the effect of the environment on him and of the effect of his own actions on the environment.

The management of environmental education includes four processes: Planning, Developing, Implementation and Evaluation.

DISCUSSION GUIDE

- Is there a need for Environmental Education in Primary Teachers Colleges?
- What measures should be taken to solve Environmental problems?
- What are the main objectives of Environmental Education for Primary Teachers Colleges?
- What topics should primary pupils and teacher training college students learn?

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

During the presentation of the modules, a number of examples from Kenya were given where environmental issues are infused into the existing curriculum at the primary school level. For example, in the "Road Safety" Programme, there are aspects which are infused into Geography, History and Civics and in the Preventive Education against Alcoholism and "Drug abuse" there are many environmental issues infused in Geography, science and History.

The group felt that there is need to co-ordinate the extent to which infusion of different Environmental Education concepts are made in the different subjects. The issue is even more crucial if the different subjects are taught by different teachers.

Also it was noted that the current method of evaluation in the region especially in the area of affective domain is still obscure and therefore there is need for improvement. A question as to whether Environmental Education might interfere with the mastery of content in other subjects was raised. As a response to this question, the Kenyan education system was given as an example where the new 8-4-4 curriculum emphasizes skills and acquisition of positive attitudestowards the environment and taking action to solve environmental problems. It was emphasized that the knowledge should be used as a tool to acquire other skills of learning.

In response to discussion questions, a number of recommendations were given. The group felt that there is need for Environmental Education to be introduced in the Primary Teachers Colleges and should be taught using the interdisciplinary approach. Environmental Education should be made a discipline in these Colleges because:

- They are the ones to pass environmental awareness to the pupils and the public.
- Environmental Education components are in the school curriculum and therefore we need to pass Environmental Education concepts to the implementing agents.

- Teachers will generally portray environmental ethics learnt in these colleges in their local areas which might be modelled by the community.

The groups felt that the measures to be taken involved:
- identification of all environmental problems;
- identification of causes of these problems;
- creation of more awareness about these problems to the members of the community, using media, teachers, associations/organizations, political meetings and leaders in the community;
- identification of possible solutions involving the community.

As far as the main objectives are concerned it was felt that they should be:
- to make the students aware and concerned about the environment and its associated problems and possible solutions.
- to increase the knowledge of the students by focusing on the specific nature of the local environment as well as considering the world-wide consciousness of environmental phenomena.
- to develop positive attitudes and skills necessary in identifying and analysing environmental problems and developing logical approaches to their solutions.
- to enable the student teacher to integrate the teaching of environmental concepts, principles, problems and issues when teaching other disciplines.

The group felt that terminology used was rather difficult and suggested that simpler terms such as "living and non-living" components or "biotic and abiotic" component for Biophysical components should be used. Further it was felt that two things should influence selection of content for Environmental Education. These are:

a) Man and environment relationship, and
b) Processes that have gone on, are going on, and will continue going on in the environment and if disturbed will lead to some problems.

Generally, the group felt that the four broad areas that will make the content for primary teacher training colleges and primary schools appear in the module:

(i) Biophysical (living and non-living) components .

Living components will comprise of all living organisms plants, animals, bacteria and viruses and organic remains of dead organisms, whereas non-living components will include weather, climate, rocks and minerals.

(ii) Ecosystem interaction.

(iii) Socio-Cultural components.

(iv) Interaction between biophysical and the socio-cultural components.

The general feeling was that there should be sufficient infusion of Environmental Education in primary school curriculum. At the Primary Teachers Colleges, Environmental Education should be taught through the interdisciplinary and multidisciplinary approach to the pre-service teacher trainees. This necessitates the development of Environmental Education dimension of pre-service teacher training curriculum for primary schools.

B. ENVIRONMENTAL EDUCATION: MODULE FOR IN-SERVICE TRAINING OF TEACHERS AND SUPERVISORS FOR PRIMARY SCHOOLS UNESCO - UNEP IEEP, (EE Series No. 6

Mr. I. N. Mulili, Dean of students, Kenya Science Teachers' College, Nairobi prepared the resume' of and a discussion guide on the above module. He presented the module at the workshop and led the plenary discussions on it. The following are the resume' of discussion guide on and conclusions of the working groups and the plenary sessions with respect to the above document.

RESUME'

INTRODUCTION

The module provides a teacher-training course in Environmental Education for the in-service training of primary-school teachers and supervisors.

Scope of Module

The module covers the following main area:

(a) The objectives of EE - Unit 2.
(b) The international efforts for the promotion of EE - Unit 3.
(c) The need for EE components at all levels of Education - Unit 8.
(d) The need for in-service training and the essential knowledge for in-service training of primary-school teachers and supervisors - Unit 4.
(e) Environmental problems and their solutions - Unit 5.
(f) The teaching methodologies for EE - Unit 6.
(g) Experiments and activities for teaching/learning of EE - Unit 7.
(h) Evaluation in EE and strategies for planning development, implementation, management and evaluation of EE component of the primary school curriculum.

Modality of Implementation

Depending on the availability of funds it is suggested that a 2 - 4 weeks course be organized for all Serving Primary school teachers and supervisors in each country.

A few selected officers would be trained first at the national level. These would in turn train others at the District level and so on to the local levels. Attempts should be made to tap participation and contribution from the national and international organizations of teachers.

The Objectives of the Module for the In-service Course

The main objectives of the module for the in-service course are summarized as follows:-

(a) To increase awareness and concern by primary-school teachers and supervisors about the environment, its problems and their solutions.

(b) To acquaint the in-service course participants with the scope (concepts, importance, goals, objectives and guiding principles) of EE.

(c) To acquaint the in-service course participants with the use of the environment as the base for interdisciplinary approach to primary-school teaching.

(d) To familiarise the participants with the fundamental environmental concepts.

(e) To familiarise the course participants with the methodologies, activities and experimentations that are considered appropriate for EE.

(f) To provide evaluation techniques and methodologies that are considered appropriate for assessment of learning attainments in EE by primary-school students and their trachers' effectiveness.

THE NEED AND OBJECTIVES FOR IN-SERVICE TRAINING OF PRIMARY SCHOOL TEACHERS IN ENVIRONMENTAL EDUCATION

Education is the main tool for society to transmit awareness, respect and solutions to most social problems. In view of this society expects those in primary-education to transmit awareness and to mobilise action to protect and improve the environment. To achieve this there is need for:

1. Justification of EE

This is done by stressing that:

(i) man and the environment are inseparable.

(ii) modern science and technology have so increased man's capabilities that he is able to over-exploit the environment to the level where he has caused great damage and threatens to destroy the environment and also himself with it.

(iii) the modern knowledge explosion and technological capabilities have made it possible for human population to increase so fast that it poses a real danger to the destruction of the environment, etc. So we need to use education to provide the necessary information, skills, and attitudes for correcting the deteriorating situation and to create sensitive concern for the improvement of the environment. This calls for the use of the serving primary-school teachers and supervisors who form the largest work force in education. These should be trained to provide the vital education about, in and for the environment.

The Primary-teachers and supervisors deal with children at the early impressionable ages. They can cultivate appropriate attitudes and commitments towards conservation and improvement of the environment. It is therefore essential that the primary school teachers and supervisors should be trained to provide effective environmental education.

2. In-service Training Objectives

The in-service training programme should favour:

(a) cultivation of positive attitudes towards the environment.

(b) commitment towards action to save the environment.

(c) urge for gaining more awareness about the environment and competency in the use of appropriate instructional materials and techniques to teach EE.

(d) confidence to express views on environmental issues in the right perspective.

THE ESSENTIAL KNOWLEDGE FOR IN-SERVICE TRAINING OF PRIMARY SCHOOL TEACHERS AND SUPERVISORS

The following areas have been identified as being vital for the primary-school teacher training to effectively teach Environmental Education.

1. The Nature and Origin of the Environment

The main concepts covered here are:-

- The natural and the social environment.
- The natural environment as made of biotic and abiotic components which are inevitably and constantly interacting.
- The abiotic aspect of the environment as composed of edaphic and climatic components.
- The biotic sector of the environment comprises the flora and fauna and their interactions.
- The social-cultural aspect of the environment consists of man-made things - eg. buildings, governments, values, man's learned behaviours like marriage, education, economics, art, religion, history, entertainment etc.
- Man as creature and creator of environment.
- The holistic nature of the environment. All the environmental components are interlinked, interacting and interdependent.
- The environment has taken a long time to evolve.

2. Some Key Concepts About the Environment

For the primary school teacher to get a comprehensive understanding and identify patterns in the environment he needs to acquire fundamental concepts, laws or principles like the following:-

(a) Matter and energy

All matter has mass and exist as solid/liquid/gas and matter is ultimately energy. Matter can change form but it cannot be created. Matter releases energy in different forms - light, sound, heat, nuclear energy and the different forms of energy can be changed to other forms. Matter is made of different elements, which react to form compounds.

(b) Interaction and change

Everything in the environment is in a state of flux. Whatever it is, is dynamic not static. But significant changes take a long time to occur.

- Matter and the different forms of energy are always changing.
- Organisms are constantly evolving.
- The earth, the other planets and the stars are always on the move and also changing.
- Society and its institutions, values, and tools are ever undergoing transformation.
- Man is a product of evolution and with his appearance psycho-social evolution started.

(c) - Man-made environment - as part of nature

Man's peculiar attributes (intellect, tool-making, language and strong emotions) have enabled him to manipulate his environment to his advantage and later to his disadvantage.

(d) Man's special responsibilities

Despite his tremendous power man cannot change the nature and requirements of life. To live, man has to observe these fundamental principles of nature. So man has special responsibility to the environment to preserve himself and other living beings.

(e) The earth as the home of life

Only the earth has the conditions which cater for existence of life:

- The elements that form protoplasm.
- The heat and light from the sun in suitable amounts for the formation of food by plants and for maintenance of suitable temperatures.
- The atmosphere to provide oxygen for life and keep off harmful cosmic rays.
- The global environment consist of the hydrosphere and lithosphere - solid components, the atmosphere-gaseous cover and the biosphere - the living things and their habitats.

(f) The Pathways of matter and flow of energy

(i) Recycling of matter

On death living things release what they have taken back to the environment.

- The carbon cycle.
- The oxygen cycle.
- The nitrogen cycle.
- The water cycle.

(ii) The flow of energy

The sun as the main source of energy and how it is conveyed through the biosphere, atmosphere and hydrosphere by the various processes and phenomena like food chain, fossil fuels, winds, waves, hydro-power etc.

(g) Man alters nature

(i) Man and the food chain - man has controlled plants and animals to provide his food.

(ii) Man and energy - with growth of civilization man demands more and more energy e.g. charcoal, fossil fuels, wind, hydroelectric power, nuclear energy etc. This has led to increasing environmental dangers.

(iii) Man and resources - a resource is that which is needed for a given purpose i.e. what man needs for survival and prosperity. Some resources are renewable while others are non-renewable. All resources are derived from the natural environment. Resources are not evenly distributed. There is great competition for the available resources. There is danger of exhaustion of non-renewable resources.

(h) Ecological system

The life supporting zone of the earth called the biosphere has diverse flora and fauna. It has also terrestrial and aquatic dimensions. Within the biosphere many factors interact to provide distinct habitats which together with their inhabitants (organisms) form ecosystems within an environment. An ecosystem is a unit of the bioshpere made of the organisms and the non-living environment each influencing the other and both necessary for life, eg. a pond, a forest, a village, a city. Ecosystems

merge together to form the biosphere.

Within an ecosystem we have producers or autotrophic organisms, consumers or heterotrophic organisms and decomposers or aprophytes.

Abiotic factors of an ecosystem

These include: climatic factors, edaphic factors, the medium etc.

The biotic factors of an ecosystem

These include: the individual, the population, the community.

(i) The human population

Man is perhaps the most abundant species. Man's demographic trends and aspirations have serious implications on the rest of the environment e.g. food needs, rapid urbanization. This leads to interruption of the ecosystems and the environment as a whole.

3. Environmental problems and their solutions

The teacher should be made familiar with local and world wide environmental problems and their solutions. The following problems are cited:

(a) Environmental resources, their deterioration and possible solutions. Basic physical needs are only food, health, shelter and clothing and his social needs are education, creative employment and participation in social system. But man has insatiable ambitions which place excessive demands on the environmental resources e.g.

(i) Energy resources - Learners to study the various sources of energy, their limitation and distributions and the harnessing of new renewable sources of energy like biogas, solar energy, water, wind, tidal power, improvement of afforestation, change of food habits and orientation towards conservation of energy.

(ii) Air Resources - Study of the structure of the atmosphere and its natural operations followed by man's disturbance of the atmosphere leading to problems like:

(i) Increase of carbon dioxide.

(ii) Change in the nitrogen balance.

(iii) Acid precipitation.

These should be followed by discussion of measures of pollution control.

(iii) Water resources - Study of the human use of the hydrosphere distribution of usable water, the water needs of man - individual, domestic, industrial, agricultural, power generation followed by discussion of water problems (shortage and pollution) and possible solutions like:-

- Adequate potable water supply.
- Adequate water supply of standard quality to industries.
- Optimal water supply for agricultural use.
- Exploitation of water for power generation.
- Check on depletion of water resources.
- Purification and pollution control.

(iv) Soil resources - Study of the origin, nature, structure and use of the soil followed by study of the various soil problems e.g. soil erosion, waterlogging, salination, desertification, shifting cultivation, soil loss due to developmental processess followed by discussion of solutions like proper land management, control of erosion, irrigation, use of suitable fertilizers, soil reclamation, afforestation etc.

(v) Mineral resource - Study of various minerals and their uses followed by coverage of their distribution in the world. Then study of problems of their depredation and solutions like:

(i) Conservation measures.
(ii) Exploitation of in-accessible areas.
(iii) Recycling.
(iv) Substitute.
(v) Reduction in armaments.

(vi) Plant resources - Study of nature of plants and their use by animals and man. Distribution of forests and vegetation.

Problems:

- Depletion of forests.
- Depletion of grasslands.
- Depletion of croplands.
- Threatened plant species.

Possible Solutions:

- Restoration of vegetation cover.
- Restoration of forest cover.
- Social agroforestry.
- Recovery of waste and denuded land and deserts.

- Management of grasslands.
- Economical land use.

(vii) Animal Resources - Study of animals in natural biosystems living in harmony with vegetation and other animals.

Problem: - Human interference and extermination of wildlife.
- Production of meat at the expense of good grains.
- Overstocking and its effects on the environment.

Solutions - Maintenance of existing biosystems and bioreserves.
- Integration of natural and social environment.
- Use of animals as a factory to convert waste materials into items of immediate utility e.g. "Cow's stabilizing effect in Indian economy".

(b) Social - Cultural factors behind environmental problems

Study of the nature and consequences of the following on the environment.

(i) - Population explosion and the decrease of per capita arable land leading to shortage of food, water, fuel, pollution, social economic conflicts - deterioration and degradation of the environment.

(ii) - Application of science and technology leading to:
(i) Green revolution.
(ii) Health revolution.
(iii) Improvement of environmental sanitation.
(iv) Industrialization.

Some Problems - High consumption of energy.
- High consumption of water and chemicals which harm the environment in some of the following ways:
- Waterlogging.
- Agrochemical pollution.
- Deprivation of genetic resources.
- Drug menace.
- Energy pollution e.g. oil fumes and spills.
- Over exploitation of resources for industries.
- Differing socio-economic systems e.g.
- "Affluence trap" in developed world.
- "Poverty trap" in developing countries.
- Poor environmental sanitation.
- Scarcity of fuels.

Solutions

(a) Living in harmony with nature by meeting basic human needs i.e. food for all, safe water for all, fuel for all.

(b) Population control by:

- Environmental education in all sectors of the population.
- Motivating people to reduce fertility rates.
- Providing economic gains.
- Providing adequate infrastructure for effective health care.
- Environmental action through community contact programmes by schools.

Teaching of environmental ethics

- To replace selfishness with otherness.
- To promote love among all men.
- To remove polarization of mankind between haves and have nots.
- To protect the environment for the well-being of mankind.
- To be committed to the improvement of the environment.
- To make global commons safe for the entire mankind and biosphere.

4. Teaching Methodologies

Generally the teaching of EE at Primary level should focus on the use of interdisciplinary approach to cultivate appropriate attitudes. This fits with the integrated approach also applied in primary schools.

a) The selection of teaching methods to be used based on:-

(i) The nature of the curriculum. Different aspects of the curriculum require different methods.

(ii) The specific objectives to be achieved.

(iii) The target group of learners - their age and past experiences.

(iv) The available learning resources.

(v) The organizational support e.g. time-table, community support.

(vi) The teachers ingenuity.

(b) In view of the above, the following methods are suggested:-

(i) Problem solving method - to train learners in the skills of critical inquiry.

(ii) Clarifying strategies - e.g. use of probing questions.

(iii) Demonstration method.

(iv) Experimentation method.

(v) Direct experience method.

It is expected that the in-service teacher will already have acquired the basic teaching skills like use of questioning, reinforcement, explanation, illustration, examples, stimulus variation, classroom management etc.

(c) For each teaching unit in EE the following approach should be used:-

(i) Goals and Objectives

(a) The broad goal:
Transfer of learning. The main goal is to induce the learner to apply different ways to solve the varied environmental problems. Teaching should therefore aim at transfer of learning.

(b) Instructional Objectives to cover the following four levels of learning:

(i) - Acquisition of ecological foundations.

(ii) - Acquisition of awareness of environmental issues and problems.

(iii) - Investigation and evaluation of issues and problems.

(iv) - Environmental action.

(ii) Learning Activities

A variety of teaching/learning activities will be apllied as deemed appropriate depending on the criteria for selection of teaching methods given above.

For primary children, activity methods and inquiry methods are recommended e.g. role playing, case studies, inferencing etc.

(iii) Evaluation activities

These should include rating of change of behaviour from observed action as well as written work (assignments, tests etc). Evaluation should be planned to cover both the broad general goal of EE as well as the specific objectives of each unit.

5. Designing of In-service Training Programme

Training programme for in-service primary school teacher and supervisors should be based on:-

(a) Teachers' academic backgrounds.
(b) Analysis of the primary school curriculum from environmental point of view.
(c) Identification of expected achievements to be attained by the teachers.
(d) Involvement of teachers is formulating the Environmental Education primary school curriculum.

DISCUSSION GUIDE

- How should an in-service training course in Environmental Education be structured, financed and managed so as to make it effective to the large numbers of primary school teachers and supervisors/ inspectors?
- What should be the objectives of an in-service training course in Environmental Education for teachers and supervisors of primary schools?
- What should be the role of primary school supervisors/inspectors in Environmental Education?
- What should be taught in an in-service training course in Environmental Education for Teachers and supervisors/inspectors of primary schools and how can the content be developed and by who?
- How can the difficult concepts and terms in Environmental Education be simplified for proper understanding by primary school teachers and pupils?

- What methods of teaching should be applied to appropriately teach:
  the knowledge,
  the skills,
  the attitudes,
  of Environmental Education in the in-service course for primary school teachers?
- What methods should be applied to evaluate in-service primary school teachers' achievements of:
  knowledge,
  skills,
  attitudes,
  in Environmental Education?

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

Broadly speaking the objectives of a pre-service and an in-service course are the same but methods or structure of the courses are different. In-service courses emphasize reinforcement or re-orientation in the thinking process of teachers who are already trained or qualified.

There are some variations in the way of organizing in-service courses in the different countries:

Tanzania: Many categories of teachers are considered for in-servicing. All teachers in primary schools are trained, therefore in-service courses are aimed at giving information and orientation when new programmes are being introduced.

Ethiopia: In-servicing is done for untrained teachers. In-service courses are done in three sessions which are considered equivalent to one year of a normal pre-service training for primary school teachers.

Malawi: In-service courses are organized for untrained and trained teachers. In-service courses are organized for up-grading purposes and for specific programmes in the case of qualified teachers.

Kenya: A variety of in-servicing courses are offered. About 40% of the teachers in primary schools are untrained and are of different academic qualifications. In Kenya there are Teachers Advisory Centres whose panels look into different aspects of the curriculum.

Environmental Education should be structured in such a way that it will be infused into the in-service training courses or programmes. Government bodies such as curriculum development centres, Universities and Diploma Colleges etc. should be involved when Environmental Education matters are being discussed.

The above institutions will form a core-body which will be involved in designing the curriculum to be covered by all in-service teachers. The core-body should also decide on the scope and timing of the curriculum. The instructors under-taking the in-service courses should prepare supportive material.

The in-service course should be given financial support by the relevant Government Ministries/Departments or any other organization ready to render assistance.

In addition to general objectives for an in-service course, re-orientation of the teachers' attitudes and updating of the content and methodology should be taken into consideration. At administration level, appropriate skills should be developed to facilitate smooth running and evaluation of the curriculum.

The roles of primary school supervisors/inspectors are many and varied. These are:

- advisory role in approach to the content matter and methodologies of implementing Environmental Education.
- help to create awareness of Environmental Education to the teachers.
- liaise with the authorities for funding in-service training in the existing institutions.
- assess whether Environmental Education is taking proper course.
- identify the right teachers for Environmental Education in-servicing who will take part in in-servicing others.

During an in-service training, the course content to be covered should be the one which touches on the Natural and Man-made environment and on social-cultural environment. The content should then be adapted to suit local situations taking into account the needs of the target groups.

The content to be taught should be:

- from the environment through which the methods of collection and analysing data from the environment are discussed.
- about the environment where essential concepts concerning the environment are used so as to take into consideration the need to conserve or to take care of the environment and
- for the environment which the need is to stimulate concern, through commitment and appreciation of environmental protection.

Development of the content should be aimed at meeting the needs at regional/local level of the target group. The content of an in-service course should be developed by:

- curriculum developers.
- teaching personnel.
- community leaders and
- supervisors/inspectors.

The difficult concepts encountered in the content should be simplified by curriculum developers by relating to real life situations. A manual/teachers' guide should be developed to give the teacher a sense of proper direction and assist him in teaching, learning and evaluation of environmental education in the classroom.

Evaluation of both instructors and people being in-serviced can be carried out using the following methods:

- questionaire.
- formative and summative tests.
- check-list.
- continuous assessment.
- practical tasks.
- peer teaching during the in-servicing time whenever appropriate.
- follow-up of the training activities by the trainers.

It was recommended that the training core should first of all be done at national level, then at district and finally at divisional levels - depending on the administrative set up of a particular country.

When trying to develop man-power, it is necessary to build a core of in-servicing staff who will then train others in the long-run. The core of in-servicing staff should have representation from different districts. It is also important to involve Heads of Schools so that they can easily take the ideas of Environmental Education to their respective schools and thus influence their staff more easily.

There is need of analysing the existing curriculum and see how Environmental Education could be incorporated. The methods to be used in teaching Environmental Education should be learner-centred and activity oriented which will lead to acquiring the required knowledge, skills and attitudes. There are no specific teaching methods pertaining to the acquisition of each level of learning in the classroom. The in-service training is mainly done during the school holidays and as such ways and means should be found so that in-service teachers could practice what they have learnt on the actual pupils who might have been retained in the school for this particular purpose.

VII. TRAINING OF SECONDARY SCHOOL SCIENCE TEACHERS AND SUPERVISORS IN ENVIRONMENTAL EDUCATION

A. ENVIRONMENTAL EDUCATION: MODULE FOR PRE-SERVICE TRAINING OF SCIENCE TEACHERS AND SUPERVISORS FOR SECONDARY SCHOOLS, Unesco-UNEP IEEP, 1983 (EE Series No. 7)

Mr. P. M. Namasaka, Deputy Principal, Kenya Science Teachers' College, Nairobi prepared the resume' of and a discussion guide on the above module. He presented the module at the Workshop and led the plenary discussions on it. The following are the resume' of the module, the discussion guide and conclusions drawn from the discussion of Working groups and the plenary sessions.

R E S U M E '

1. PURPOSE OF THE MODULE

The module intends to help science teachers make science teaching more environmental. It does so by exploring a number of ways that science teachers can contribute through their lessons with pupils to an improved Environmental Science. Environmental Education should have contributions from all subject areas of the curriculum. Hence the module stresses the fact that the curriculum and teaching must adopt an interdisciplinary approach to student teaching and learning in order to solve real and complex environmental problems.

2. JUSTIFICATION FOR TEACHING ENVIRONMENTAL EDUCATION IN SECONDARY SCHOOLS

The module sees Environmental Education as a contribution to the solution of real problems. The goal for Environmental Education is Education for the Environment.

People's lifestyles have adverse effects on the environment. Hence education and students in secondary schools can influence through examples how people's lifestyles can affect the Environment. It is also important that educators should be able to choose the manner, timing and extent to

which the students should be involved in environmental issues. Educators need to develop in students the confidence in and feeling that they can participate in change when science is properly applied to Environmental issues. It is important that the education of science teachers induct the learning experiences that they should provide to their own pupils on matters relating to environmental issues.

Many environmental problems can be solved by considering complex economic, social and political considerations of a particular country. Problems of human and social developments are part of a wider environmental science. Hence people should be aware of Environmental Education issues locally, nationally and internationaly. This makes the teaching of Environmental Education an essential component in our curriculum.

3. OBJECTIVES OF THE MODULE ENVIRONMENTAL EDUCATION

The module identifies twelve broad objectives for Environmental Education. According to the module these are:

a) To alert the student science teachers to the urgency of Environmental crisis.
b) To present the origins of Environmental Education.
c) To provide rationale for, and a sense of urgency for Environmental Education in science and other teaching.
d) To define a set of characteristics or guidelines for Environmental Education.
e) To indicate the relation between science teaching and Environmental Education.
f) To establish a list of objectives for Environmental Education in Science teaching.
g) To promote problem solving as the central feature of Environmental Education in science teaching.
h) To provide some basic concepts that are useful in Environmental problem-solving.
i) To identify and acquire skills in the various stages of curriculum planning for Environmental Education in science classrooms.
j) To know and experience teaching strategies that are useful in Environmental Education.

k) To recognise criteria and to practise using them in the evalaution of Environmental Education.

1) To identify and reduce factors that constrain the teaching of Environmental Education by teachers and to provide conditions and support for teachers that may facilitate its implementation. These broad objectives are achieved through specific objectives given in each unit in the module.

4. ORGANIZATION OF THE MODULE

The materials in the module are organized in discrete units that group themselves naturally in six chapters. The units of the module are based on the twelve Environmental Education objectives relating to science teaching and Environmental issues. Each unit is designed for a discrete session of one hour or its multiples thereof.

Units have been found to have widespread usefulness in science teacher education. Users of each unit should familiarize themselves with the content so that they can implement it in flexible and meaningful way to students.

Each unit starts by summarizing its ideas, suggesting how to implement them and gives clear objectives with wider Environmental Aims that pertain to them. In the summary of each unit, pre-service teacher needs, pedagogical techniques, Resources and suggested time are given. With this approach, teacher educators and pre-service teachers should be able to evaluate the effectiveness of their performacne in a unit as well as the worthwhileness of ideas presented. Worksheets are provided for each unit for easy reproduction and possible use in the training programme.

Resource materials in the unit have wide adaptability across countries and education systems. It is therefore necessary for examples to be chosen and used appropriately.

The different chapters contain different units as shown in the table below:

CHAPTER	UNITS	
1. THE ENVIRONMENTAL PROBLEMATIQUE AND EDUCATION'S RESPONSE.	Unit I:	The Nature of Environmental Issues.
	Unit II:	The Environmental Challenge to Education.
	Unit III:	Defining Environmental Education.
	Unit IV:	Science Teaching and Environmental Education.
2. SCIENCE EDUCATION: AN ESSENTIAL CONTRIBUTION TO ENVIRONMENTAL EDUCATION.	Unit V:	Environmental Education as part of Science Education.
	Unit VI:	Observing and classifying - Basic skills in science and Environmental Education.
	Unit VII:	Suggesting hypotheses and designing experiments.
	Unit VIII:	Science, Society and Technology.
3. CURRICULUM TASKS IN ENVIRONMENTAL EDUCATION FOR SCIENCE TEACEHRS.	Unit IX:	Identifying an Environmental problem.
	Unit X:	Commencing an Investigation into an Environmental problem.
	Unit XI:	Proposing and elaborating on possible solutions.
	Unit XII:	Do I want to get involved?
	Unit XIII:	Identifying possible strategies for action.
	Unit XIV:	Evaluation of social action.
4. TEACHING STRATEGIES FOR USE IN ENVIRONMENTAL SCIENCE EDUCATION.	Unit XV.	The Airport location game - a simulation.
	Unit XVI:	Planning a field trip.
	Unit XVII:	Planning a local Environmental trail.

CHAPTER	UNITS
5. EVALUATION OF ENVIRONMENTAL EDUCATION:	Unit XVIII: Assessing Societal aspects of Science learning. Unit XIX: Evaluation of Environmental Objectives in Science learning. Unit XX: Environmental Evaluation of Curriculum materials.
6. IMPLEMENTATION OF ENVIRONMENTAL EDUCATION AT THE SCHOOL AND SYSTEM LEVELS.	Not presented in Units.
7. APPENDIX I: SCIENCE CONCEPTS OF PARTICULAR IMPORTANCE IN ENVIRONMENTAL EDUCATION.	A 1. 1: Energy. A 1. 2: Ecosystem. A 1. 3: Resources. A 1. 4: Food Production: Traditional versus Modern Agricultural. A 1. 5: Pollution. A 1. 6: Human Population.
APPENDIX 2: DEFINITIONS AND AIMS OF ENVIRONMENTAL EDUCATION.	
APPENDIX 3: DECLARATION OF THE TBILISI INTERGOVERNMENTAL CONFERENCE OF ENVIRONEMNTAL EDUCATION.	
APPENDIX 4: THE UNESCO-UNEP INTERNATIONAL ENVIRONMENTAL EDUCATION PROGRAMME (IEEP).	

5. SUMMARY OF CHAPTER CONTENT IN THE MODULE

Chapter I: The Environmental Problematique and Education's Response.

The chapter introduces student teachers to the origins of Environmental Education as a response to environmental problems locally, nationally and globally. Environmental Education is then developed through objectives and particular characteristics. The features of Environmental Education are contrasted with those of traditional science teaching. The chapter ends with a unit which helps teachers to emphasize Environmental Education in their science teaching and to recognise this as a contribution to the totality of Environmental Education.

The chapter starts by listing staccato comments drawn from Robert Allen's book "How to Save the World". The book is publicising the world conservation strategy inorder to improve the quality of life. It is recognized that the quality of life is possible through dual processes of development and conservation.

Such a strategy would help to advance achievement of sustainable development through conservation of living resources but will not highlight strongly issues like disproportionate consumption of energy and mineral resources by developed and developing nations.

It is further realized that human activities are reducing steadily the capacity of the world to go on sustaining life. Further, world lifestyles are different. For one group, size is static but consuming increasing amounts of resources while for the other group, it is increasing in size and consuming more resources. Since the two lifestyles are visible to each other, they both lead to higher aspirations and possibilities.

The quality of living Environment is also different between the two lifestyles. In the population of high consumption, there is improved quality of life. In the population with low consumption, there is generally inadequate provision of shelter, food, fuel and absence of suitable sanitation.

Hence the case for a better Environment is different in the two cases. The differences mentioned are part of the Environmental Problematique that will be taken up in the study of environmental issues in this chapter.

Chapter 2: Science Education - An essential Contribution to Environmental Education.

The chapter deals with the nature of science and its relationship to Environmental Education. It deals with some science concepts that relate to Environmental Education.

The different aspects of science e.g. knowledge, experimenting, technology, research etc. that have been produced by the processes of science are discussed in the chapter. The various processes of science are identified and summarised in this chapter as an introduction to the characteristic of science:- the problem - solving approach that has to be applied in solving environmental issues. Processes discused include observation, communication, control of variables, experimenting, hypothesising, measuring variables and concept formation. These processes:

(i) make up statements that describe problem - solving approach used by scientists.

(ii) when applied show us how scientific work is undertaken.

Problems to which science addresses itself are many and varied: including environmental problems.

The chapter emphasizes problem - solving approach as an integral part of Environmental Education as Environmental Education seeks to provide students with opportunities to be actively involved in working towards the solution of real problems. Previous science teaching has not emphasized problem - solving approach but has been more concerned with exposition and acquisition of scientific knowledge as depicted in textbooks.

The acceptance of goals of Environmental Education by science teachers will broaden the pupils' view of science assisting them to solve problems.

An introduction to the chapter gives two main reasons why science is taught in secondary schools. These are:-

(i) to prepare a minority of students for specialized training in science and technology.

(ii) to develop scientific literacy in the majority of students for them to know, understand and feel about science.

The different meanings given to the word science by different people such as:

- bodies of knowledge about the natural world arranged under different subject.
- research or pursuit of truth.
- development of technology intended to benefit mankind.
- finding out, experimenting, measuring are all given as different interpretations of what science is.

A population literate in science is not only necessary but is desirable in understanding some of the environmental issues. Scientific literacy includes an appreciation of the strenths and limitations of science and is more likely to ecourage the balance of contributions from different subject areas to solve environmental problems.

The chapter gives one description of scientific literacy that makes use of the following seven dimensions:

a) Interest, b) Practical Skills, c) Processes of Science,
d) Concepts in Science, e) Nature of scientific knowledge,
f) Values, g) Science-Society.

Brief statements are made under each dimension to explain what is expected of a scientifically literate person. This is found on pages 46 - 55 of the module.

The four units in the chapter include activities and pedagogical training which can assist science teachers in achieving scientific literacy in their students. pp 56 - 81.

CHAPTER 3: CURRICULUM TASKS IN ENVIRONMENTAL EDUCATION FOR SCIENCE TEACHERS

This chapter consists of curriculum tasks that a science teacher must have to implement an environmental emphasis in the classroom. Six stages of the teacher's curriculum plan are identified and elaborated upon in the chapter. These are:

(i) identifying an environmental problem.
(ii) investigating a problem (identifying and acquiring the relevant background knowledge to be used by the class).
(iii) preparing and evaluating possible solutions to the problem.
(iv) getting involved.
(v) identifying possible strategies for Social action by the class and teacher.
(vi) evaluating the strategies for social action.

The chapter realizes that to extend science teaching into Environmental Education needs the commitment and motivation of the teacher and not the method of teaching. In Environmental Education, the following aspects are important.

a) application of science.
b) motivation for getting involved.
c) creative responses to real situations.

In carrying out all these aspects, the role of the teacher is crucial and personal. The basic problem underlying environmental issues are the kind of people we are, the values we hold and what we are to do to improve the world we and future generations live in.

The chapter gives suggestions of how science teacher educators can become involved in Environmental Education with their students. It is also realized that the suggestions given need to be adapted to suit the local situation. The procedures suggested in the chapter are also useful to science teachers with their own pupils in secondary schools.

At the end of the chapter, a set of procedures (Units IX - XV), give an outline of how the problem of solid waste disposal could have been tackled using them. The chapter concludes with a challenge that could be a check on both the skills acquisition and on the commitment that is built up through environmental learning. This is done by planning for a junction event where the group will communicate about an environmental issue to a chosen target audience.

The rest of the chapter is taken up by units that address themselves to specific procedures: pages 84 - 124.

CHAPTER 4: Teaching Strategies for use in Environmental Education

A number of teaching strategies to implement curriculum tasks in Chapter 3 that are useful for Environmental Education in the classroom are dealt with in this chapter. The teaching strategies are introduced experimentally to the science teachers in the different units in the chapter.

Teaching strategies using buzz groups and brain storming are some of the suggested ones. In using buzz groups, a short talk or other limited presentation is given and the class works in small groups for a short time before they come back with a feedback to the teacher. Brainstorming i.e. using a number of brains to throw up ideas, without evaluating them, that could contribute to the solution of the problem is also dealt with in the chapter.

Other strategies of teaching suggested include the following: use of audio-visual and other non-verbal stimuli, debates and projects, simulation and other games, conducting field trips and the development of the learning trail.

In the past science teaching was restricted to few pedagogical techniques like:

(i) teaching (teacher-centred) exposition.
(ii) questioning.
(iii) laboratory confirmation by experiments of facts and theory already presented. The development of a scientifically literate person who will be actively involved about the environment requires a greater number of techniques to be used in teaching.

Teaching strategies developed in the chapter falls into two parts. Part A deals with teaching strategies that are suitable for classroom use, whereas part B deals with techniques that are set outside the classroom and school. Both approaches are meant to supplement each other in science teaching.

Part A: Techniques for classroom use:

This part of the chapter outlines nine strategies of teaching suitable in the classroom. These are: (1) buzz group, 2) Class discussion, 3) Group discussion, 4) Brainstorming, 5) Committee work, 6) Debate, 7) Questionaire, 8) Media imitation and 9) Reflection. pp. 125 - 127.

For each technique given, the module defines it, suggests when it should be used and gives advantages/disadvantages involved in its usage.

Two strategies which are particularly important to the teaching of science for Environmental Education are Role -playing via Simulation Games and Field Study or Excursions. Role-playing is discussed and presented in Unit XV pp. 128 - 136.

Part B: Techniques for use beyond the classroom

The two techniques suggested for use outside the classroom are Field Study or Excursion and development of a local Environmental Trail.

Characteristics that need to be met before one takes students on field trips are discussed in details. Aspects like conduct of a field trip, location and purpose of a field trip, planning for the field trip are outlined on pages 137 - 140.

Two units are then presented that appropriately deal with planning a field trip: Unit XVI, pp 141 - 146, planning a local environment trail: Unit XVII, pp. 147 - 151.

CHAPTER 5: EVALUATION OF ENVIRONMENTAL EDUCATION

The chapter considers evaluation in Environmental Education in a number of senses. For example, use is made of content analysis to provide evaluation of curriculum materials like textbooks and other student resources. There are still problems with the availability of resources for Environmental Education. Effective Environmental Education will be related to local, topical and current situations. Hence it should be realised that environmental resources produced in one country might not exactly fit in a school situation of another country. Environmental issues will therefore be based to the nation's own cultural scene.

Resources that will be found useful for Environmental Education by science teachers will include newspaper articles, information from experts/non-experts, statistics and data obtained locally.

At the end of the chapter, a way of checking what sorts of teaching and learning experiences are in fact used is presented.

Since Environmental Education has characteristics that differ from most of the traditional secondary school curriculum, it follows that its evaluation will differ from the usual procedures used in other subjects.

Emphasis on evaluation in science in secondary schools has been on the achievement of certain cognitive and a bit of psychomotor objectives. There has been little or no emphasis in many secondary science courses on the acquisition of attitudinal or other affective outcomes of learning. A number of science courses since 1970 are emphasising the science and society aspects and other dimensions. Where learning of this type has been part of the regular examination of the subject, evaluation information about teaching can be obtained from analysis of the examination questions.

The chapter has units that deal with different aspects of evaluation of Environmental Education. Assessing of Societal aspects of science learning is presented in Unit XVIII, pp 154 - 160, Evaluation of environmental objectives in Science learning, Unit XIX, pp 161 - 165; Environmental Evaluation of Curriculum materials, Unit XX, pp 166 - 172.

CHAPTER 6: IMPLEMENTATION OF ENVIRONMENTAL EDUCATION AT THE SCHOOL AND SYSTEM LEVELS

This chapter is concerned with the support that the science teachers must have from school authorities and the education system for them to be able to contribute Environmental Education through their science lessons. Giving science teachers concepts of Environmental Education, skills and strategies for its design and teaching is only one of the requirements for the implementation of Environmental Education in schools.

Education systems have constraints that hinder innovation in curriculum and teaching. These constraints should be identified and controlled to make the teaching more environmental. Some constraints are beyond the classroom teacher and hence people like supervisors have a big role to play. Science supervisors should be aware of their roles and facilitate conditions conducive to the introduction of Environmental Education.

The nature and gravity of the constraints on the teacher will vary from country to country and so the ideas presented in this chapter should be adapted to suit particular situations.

Support structures to Environmental Education can be dealt with at three levels: namely within the school, within the education system and within the community.

It is expected that teachers and supervisors will identify which constraints apply in their case and how they can modify or adjust them so that structures emerge which support the teacher in the classroom.

The chapter is different from the others in that it is not presented in Units.

The chapter is addressed to all people who shape and determine tasks that science teachers have to perform. It sets out to raise issues of constraint and support as they are important in the innovation of Environmental Education.

The four phases that are necessary for successful implementation of Environmental Education are:

a) Recognition.
b) Identification.
c) Responsibility.
d) Maintenance.

These are treated exhaustively on pages 174 - 180.
Other constraints that could be met in the implementation of Environmental Education are:

(i) Involvment of personnel not schooling.
(ii) The action objection or outcome.
(iii) Use of pedagogical or methods not common in traditional courses. pp. 180 - 181.

DISCUSSION GUIDE

- What type of curriculum must be designed for Environmental Education in secondary schools?

- What type of teaching and by which type of teacher, can achieve the proper understanding of Environmental Education?

- What type of training programmes should be mounted for Environmental Education teachers?

- How does one suggest Environmental Education to be introduced?

- To what extent in a Science class could one dwell on Environmental problems at the expense of giving science content?

- The curriculum is overcrowded. The question raised is since the curriculum is not static, why should it not be reorganized to include Environmental Education?

- The subject might be one of the specialized one and optionable to atttain low status. With the right attitudes and approach, the importance of the subject should sell itself. The question of low status applies if we are putting new wine in old bottles. OR ARE WE?

"The module is supposed to be for use with science teachers as part of their pre-service training course after they have been introduced to the basic aspects of the theory and practice of teaching science subjects".

- Is this the right approach for usage? Is one trying to change values, attitudes and practices already committed to a certain subject?

  Could the approach and materials be introduced to general (integrated) scientists for usage in due course?

  Do such people exist?

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

Participants agreed that for immediate action a multidisciplinary approach to curriculum should be employed, while for a longterm an interdisciplinary approach should be adopted.

As regards the type of teacher, he should be committed, pre-serviced and/or in-serviced formally to get him/her fully converted into Environmental Education cycle.

All types of teaching methods should be used.

Environmental Education should be introduced through a practical approach by a committed teacher who is ready to work even beyond working hours. The society also be made aware of the need for Environmental Education.

It is realised that effective teaching - learning activities take place when they are related to a real life situation found in the Environment.

The participants noted that while curriculum for secondary school is heavily overcrowded, it would be advisable to merge some subjects through the introduction of Environmental Education. In so doing, this would save resources such as personnel, time and instructional materials.

Another approach would be to include Environmental Education as a subject and make it compulsory to all students. With regard to pre-service training of science teachers for secondary schools it was suggested to include the following two courses:

(i) Environmental Science and
(ii) Environmental Education Teaching Methodologies.

It was fully accepted that the use of modules in the teaching of Environmental Education is desirable. However, it was noted that teachers using modules should make lessons more creative.

During the plenary discussion it was stressed that the best way to convert students and staff into liking Environmental Education is to make Environmental Education more interesting and attractive.

People should be able to see the fruits of Environmental Education for them to take interest in the subject.

Personnel orientation through regular exposure to Environmental Education is a good approach to environmental awareness. But this needs patience in order to develop motivation.

University authorities seem to be a very resistant group to many innovations developed in schools. An innovation such as Environmental Education requires university professors and administrators to come down to earth. They should be made aware of the environmental concerns and the need for Environmental Education through a workshop for key personnel from various institutions including Universities.

Unesco may be requested to provide financial and technical support to institutions which have already established themselves as centres of Environmental Education to organize Workshops or Seminars for key personnel from the different educational institutions. Tutors of Environmental Education must have a mastery of content in a basic subject such as Biology, Geography etc. They should have initiative in developing ideas and methods in Environmental Education that can lead to better understanding of the environment and its problems and to a change of behaviour for the protection and improvement of the environment. There is need to rally support from policy makers and experts to make Environmental Education efforts a reality.

It was generally accepted that Environmental Education should be infused into the existing secondary school curriculum and/or be introduced as a subject. Science subject matter should be taught within environmental contexts. Pre-service and in-service courses for teachers should be organized. A wide range of methodologies using local environment for teaching/learning should be encouraged. Universities should be fully involved in Environmental Education efforts in order to consolidate national efforts towards the protection and improvement of the environment.

B. ENVIRONMENTAL EDUCATION: MODULE FOR IN-SERVICE TRAINING OF SCIENCE TEACHERS AND SUPERVISORS FOR SECONDARY SCHOOLS Unesco-UNEP IEEP, 1983 (EE Series No. 8)

Mr. Mbaka Njeru, Tutor, Environmental Science Department, Kenya Science Teachers' College presented the above document to the Workshop. He led discussion in the plenary sessions on the above module. He had prepared a resume' of the module and a discussion guide on it which are presented below. They are followed by the discussions, recommendations and conclusions drawn at the plenary and group sessions.

R E S U M E '

INTRODUCTION

A. Scope of the module: Materials intended to cover many aspects of Environmental Education essential for secondary school level instruction.

B. Target audience: Secondary school science teachers and Supervisors who have had little or no orientation toward Environmental Education.

C. Implementation requirements: For Fulfilment by the management and the teacher trainees.

OBJECTIVES OF THE IN-SERVICE TRAINING

Trainees are expected to:

1. Increase their environmental awareness and appreciation of the need and guiding principles of Environmental Education.
2. To develop competence of the environmental dimension by acquiring essential knowledge about the environment.
3. Develop and nurture an understanding of the fundamental environmental concepts and their science content, and vice versa.

interdisciplinary approach.

5. Develop competence in the use of problem-solving method using activities and experiments which motivate learners.
6. Acquire competence in the development of lesson plans and the use of appropriate teaching aids.
7. Develop proper evaluation techniques to assess the learning of students.
8. Learn alternative strategies for planning, development, implementation, management and evaluation of curricula in Environmental Education.

THE HISTORY AND PHILOSOPHY OF ENVIRONMENTAL EDUCATION

A. Nature Study as an early expression of interest in the natural environment.
B. The development of disciplines.
C. The effects of Science and Technology.
D. The Stockholm Conference on Human Environment.
   (i) Global Environmental Concern.
   (ii) Declaration on the Human Environment.
   (iii) Action plan as the immediate environmental work programme for the International Community.
E. The Intergovernmental Conference on Environmental Education.
   (i) The declaration and recommendations on Environmental Education.
   (ii) The role of Education.
   (iii) Training of Personnel.
   (iv) Developing Instructional Programmes and Materials.
   (v) Research in Environmental Education.
F. The Philosophy of Environmental Education.
   (i) The rate of social and cultural evolution is faster than the rate of biological evolution.
   (ii) Environmental problems are often complex and require the expertise of various disciplines for their solution.
   (iii) Environmental problems should be seen, first, in their local context for the individual to see their relevance to him, and second, in their magnitude and pervasiveness.
   (iv) The human population, more than any other living species, has wrought damage to the environment and, therefore, it

should be held responsible for corrective actions that will hasten the recovery of damaged environments and prevent the destruction of others.

(v) The welfare and continuing existence of humankind on the earth depends on the values people have concerning:
   a) regard and consideration for others, particularly the less fortunate.
   b) care and protection of humanity's resources.
   c) strong drive to actions that serve humanity as a whole and improve the environment.

(vi) The behaviour of people to their natural and built environments in the overt expression of their values and attitudes and their understandings and skills.

(vii) A harmonious ethical relationship of man to his environment, having environmental conservation and enhancement as its theme, can be developed from early childhood onwards through formal and nonformal education.

G. Guiding Principles of Environmental Education.

(i) Environment viewed in its totality, interdisciplinary and Environmental Education as a lifelong process.

(ii) Environmental Education Programmes to develop in each individual an ethics or code of behaviour which would lead to proper use of the environment.

(iii) Environmental Education should lead each individual to acquire proper values and attitudes towards the environment.

(iv) Environmental Education should start from the lowest level to the highest and each individual should be actively taking part.

H. The goal and objectives of Environmental Education.

(i) goal: Implicit in the guiding principles of Environmental Education.

(ii) objectives: To develop into each individual:
   a) a sensitivity to events and changes in the physical, biological, social, economic and political aspects.
   b) a sincere desire to correct human problems.
   c) ability to identify and know how to solve environmental problems.

I. Science and Environmental Education.

Process of science, particularly logical reasoning, reduce guesswork in finding solutions to environmental problems.

ESSENTIAL KNOWLEDGE ABOUT THE ENVIRONMENT

A. Structure and function of an Ecosystem.

(i) Types of ecosystems.

(ii) Habitat and Ecological Niche.

(iii) Concept of limiting factors.

B. ENERGY FLOW IN THE ABIOTIC COMPONENT OF THE EARTH ECOSYSTEMS

(i) The Earth's Ultimate Source of energy.

(ii) Factors affecting Energy of Incoming Solar radiation.

(iii) Water cycle and its role in Energy flow.

(iv) Energy transformations and eventual 'loss'

(v) Energy from the Earth's interior.

C. ENERGY FLOW IN THE BIOTIC COMPONENT OF THE EARTH ECOSYSTEM

(i) Photosynthesis.

(ii) Respiration.

(iii) Food chain and Food web.

(iv) Trophic levels.

(v) The ten per ent law.

D. MATERIAL FLOW IN THE BIOCHEMICAL CYCLES

(i) Earth processes and nutrients flow.

(ii) Water cycle and nutrients flow.

(iii) The gaseous cycles.

a) Carbon cycle.

b) Nitrogen cycle.

c) Oxygen cycle.

(iv) Sedimentary cycles:

a) Phosphorus cycle.

b) Sulphur cycle.

(v) Biological magnification.

Concentration of some substances in living things e.g. build up of D.D.T.

E. POPULATION DYNAMICS:

(i) Density.

(ii) Natality, mortality and dispersal.

(iii) Age structure.

(iv) Population growth.

(v) Regulation of population size.

(vi) Natural selection and evaluation.

F. HUMAN INTERVENTION IN NATURAL RESOURCES

(i) Human activities that affect Energy flow in the Earth Ecosystem:

a) Increased combustion and carbon dioxide production.

b) Smog, soot and other particulate matter.

c) Ozone.

d) Concentration of human population, heat sink and wind flow in cities.

(ii) Human activities that affect materials in the Earth Ecosystem:

a) Activities that disrupt natural cycles e.g. imbalance of carbon dioxide.

b) Activities that release toxic substances e.g. mercury, cadmium, lead and radioactive substances.

c) Activities that introduce a negligible amount of material as compared to natural flows of the same material in a sensitive spot e.g. oil leaks.

d) Activities that introduce into the natural cycles synthetic, biologically active substances such as synthetic organic pesticides, PCBs, and herbicides.

(iii) The human ecosystem.

The human race is the single predominant influence in nature. Human race has created and organized many institutions related to agriculture, forestry, fishing, mining, etc. All these require resources from the environment.

ESSENTIAL KNOWLEDGE ABOUT PROBLEMS OF THE ENVIRONMENT

A. Dimensions of environmental problems

(i) The physical consequences of environmental problems.
(ii) The Geographical scale of environmental problems.
(iii) The time scale of environmental problems.
(iv) The Socio-economic systems affected by environmental problems.

B. Causes of environmental problems

1. Rapid population growth leads to:
   (a) Food shortage.
   (b) Decreasing surface area.
   (c) Water shortage.
   (d) Energy crisis.
   (e) Scarcity of the Earth's materials.
2. New problems from Science and Technology:
   (a) Medical technology.
   (b) Agricultural technology.
   (c) Energy technology.
   (d) Food technology.
   (e) Material substitution technology.
3. Development and Industrialization bring new problems.
   (a) Cost of development.
   (b) Development in developing countries.
   (c) Increased waste production and pollution.
   (d) Cost of pollution.
4. Concentration of Human Population (Urbanization)
   (a) Unemployment and poverty.
   (b) Concentration of wastes.
   (c) High incidence of diseases.
   (d) Malnutrition.
   (e) Conflicting land uses.

C. Broad-based measures toward the solution of environmental problems

1. Control of population growth through:
   (a) Education.
   (b) Persuation.
   (c) Medical Science.

2. Using Science and Technology to solve environmental problems.
   (a) Developing new and unconventional problems.
   (b) Expanding and improving traditional food sources.
   (c) Treatment of malnutrition.
   (d) Pollution abatement.
   (e) Recycling of wastes.
3. Planning Human intervention on the natural processes to:
   (a) improve the quality of life.
   (b) produce minimal negative environmental impacts.

TEACHING METHODOLOGIES IN ENVIRONMENTAL EDUCATION

A. The quality of teaching:
   (i) Latest trends in education focus on the learning abilities of the child.
   (ii) Active student participation as a key to learning.
   (iii) A wide variety of methods should be used.
   (iv) Teaching should be more interesting.

B. Problem - solving as an approach:
   In problem - solving both discovery and expository methods may be used. These include:
   1. Inquiry method:
      (a) Discovery through inquiry.
      (b) Invitation to inquiry.
   2. Research method:
      (a) An experimental method.
      (b) Survey research.
   3. Case method:
      (a) An event.
      (b) Human behaviour.
      (c) A news story or a speech.
   4. Simulation activities:
      (a) Games.
      (b) Role-play.
   5. Discussion:
      Problem-solving is possible through a free interchange of ideas. Discussion enables those involved to:
      (a) be informed.
      (b) some certain instances bring about a change into the attitude.

C. Projected Method:

Carrying out a task conducted in or out of the classroom by:

(i) a group or

(ii) an individual.

D. Field trip:

Learning activity carried on by a group outside the classroom.

ACTIVITIES AND EXPERIMENTS FOR TEACHING THE ENVIRONMENTAL DIMENSION OF SECONDARY SCHOOLS.

Activities/Experiments:

(i) Structure and function of the ecosystem.

(ii) Energy flow in the Earth Ecosystem or Ecosphere.

(iii) Energy in the biosphere.

(iv) Materials flow in the biochemical cycles.

(v) Population dynamics.

(vi) Human interventions in ecological processes.

EVALUATION IN ENVIRONMENTAL EDUCATION

A. Rationale for evaluation.

(i) Accounting for inputs and outputs of the activity.

(ii) Improving the Environmental Education activity.

(iii) Motivating personnel and participants.

(iv) Directing the activity toward the desired goals.

(v) Providing for decision making.

B. The objective of evaluation.

(i) to evaluate the performance of the teacher.

(ii) to evaluate the learning environment.

(iii) to evaluate the student learning.

C. The process of evaluation:

This is done by considering:

(i) Source of information:

(a) Direct source-students.

(b) Indirect source - teacher.

(ii) Instrument Construction:

(a) Written responses.

(b) Oral responses.

(c) Performance.

STRATEGIES FOR THE IMPLEMENTATION OF THE ENVIRONMENTAL DIMENSION OF SECONDARY SCHOOL SCIENCE

A. Conceptual framework for an Environmental Education Programme:
The teaching of an environmental dimension of secondary school science is built around the following main ideas:
   (i) Science as a medium for teaching about the environment.
   (ii) Learning Science Content and processes should lead to greater awareness and appreciation of one's environment.
   (iii) Science lessons should concentrate mainly on local examples.
   (iv) Science lessons should venture into moral and social implications of scientific activities, technological development and industrial thrusts.
   (v) Open - ended questions are considerations of alternative strategies, which are techniques used in scientific investigations, should be applied to the formulation of school project designs and other suggested planned changes in the environment.

B. Pre-implementation strategies need:
   (i) Assessments.
   (ii) Objectives.
   (iii) Curriculum development.
   (iv) Teacher training.
   (v) Preparing for evaluation.
   (vi) Schedule of activities.
   (vii) Other considerations preparatory to implementation:
      (a) security permit and authorization.
      (b) Site selection.
      (c) Funding.

C. Implementation Strategies at the instructional level:
   (i) Teacher preparation.
   (ii) Class interactions.

D. Implementation Strategies at the management level:
   (i) Administration mode.
   (ii) Geographical mode.
   (iii) Curricula mode.

E. Support action to implementation:

Implementation is not done in vacuum but it is carried out where a population; institutions, a social and economic order exist. To obtain support it needs to:

(i) involve people from:
  (a) The community.
  (b) Government agencies.
  (c) Organizations.

(ii) Consider topics and methodologies suggested by people included in the programme.

(iii) Encourage the community to take any project as their own.

(iv) Make sure that at the initial step of implementation at the instructional level cluster trained teachers in the selected schools to give the programme at least an even chance for survival.

(v) Supervisors should take on a consultative rather than inspectorial role.

(vi) Use media (TV, local radio station, local newspapers) to inform the community of the new programme.

(vii) Seek legislative action endorsing and providing financial support to the programme.

DISCUSSION GUIDE

- Is this module adaptable to our local conditions?

  The in-service programme focuses on a trained teacher with specific methodologies and approaches in science subjects.

- How far can we involve the in-service teacher in formulating curriculum and designing equipment that will be directly addressed to environmental issues?

- How best should supervisors enhance environmental awareness and teaching after in-service training in the secondary schools?

- What should an in-service training for supervisors contain and how should it be implemented?

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

The participants agreed that the module is adaptable to our local conditions. While the content and related concepts are relevant, each region should identify the most immediate and pressing areas and in-service their personnel accordingly.

Assessment should be conducted to identify experiences, knowledge, skills, methodologies, and teaching-learning materials that have been used by the serving teachers in order to determine what is to be included in the in-service course content.

Measures should be instituted to make serving teachers more aware of Environmental Education, its philosophy, methodologies and be more committed to it.

There is need to organize mini-in-service courses, with the assistance of those who have already been inserviced, to other teachers in their areas/localities. We need to ensure that inspectors/supervisors play a consultative role in addition to their inspectorial role. Also it was felt that inspectorial service should give remedial assistance where need arises.

In-service should include all that is in the new curriculum and should incorporate administrative strategies, managerial skills and practical in their day to day operations.

It was further noted that there is a need to facilitate a forum for inspectors, trainers and teachers to come together to discuss Environmental Education matters of common interest to them as a group.

The idea of introducing age limit to in-service programmes should be abolished. Teachers of all ages should be given an opportunity to exchange views and experiences which can be tapped for practical use in the school or community.

An effective network system should be established among educational institutions in the region and sub-region. Facilities within NEIDA could be utilized to facilitate this.

Most countries in the region and sub-region undertake some form of in-service training for supervisors/inspectors within their countries and abroad. However, this is inadequate to meet the current demands for the introduction of Environmental Education. UNESCO should be requested to assist in funding training activities for inspectors/ supervisors, trainers and other target groups in the regional and sub-regional levels.

From the foregoing discussion, it is clear that there is an urgent need for changing the role of inspectors of schools from being inspectors, who inspect what is going on in schools, to facilitators and advisors of the teaching/learning process in schools and teacher training colleges. Inspectors/supervisors can play a major role in the development of effective implementation of Environmental Education. This role should be utilized as effectively as possible.

A network of information on Environmental Education through established facilities such as NEIDA should be explored to ensure information flow in the region and subregion.

VIII. TRAINING OF SECONDARY SCHOOL SOCIAL SCIENCE TEACHERS AND SUPERVISORS IN ENVIRONMENTAL EDUCATION.

A. ENVIRONMENTAL EDUCATION: MODULE FOR PRE-SERVICE TRAINING OF SOCIAL SCIENCE TEACHERS AND SUPERVISORS FOR SECONDARY SCHOOLS, Unesco-UNEP IEEP, 1985 (EE Series No. 9)

Dr. G. M. Nguru, Faculty of Academic Studies, Daystar University College prepared the resume' of and the discussion guide on the above module which he presented at the Workshop and lead the discussion on it in the plenary sessions. The above mentioned resume and discussion guide along with conclusions drawn from the working groups and plenary sessions are as follows:

R E S U M E '

1. Scope and objectives

This module provides the contents of an experimental teacher-training course in Environmental Education (EE) for the pre-service training of secondary school social science teachers and supervisors. The preparation of this module has been based on the assumption that the minimum qualification for secondary school social science teachers and supervisors, who will be joining the pre-service training programmes would be graduating in any of the social science subjects. Therefore, they may not have sufficient background in science, especially ecology. An effort has therefore been made to clarify certain fundamental scientific concepts, which would help in knowing the environment in its totality.

The content of the module has been organized in ten chapters to meet the following specific objectives:-

To increase environmental awareness, sensitivity and consciousness of pre-service (student) teachers and supervisors towards the environment, its problems and their solution and prevention.

To acquaint pre-service teachers and supervisors with the need, the importance, the goals, objectives and guiding principles of environmental education.

To acquaint pre-service teachers and supervisors with essential knowledge about the environment and its allied problems.

To acquaint pre-service teachers and supervisors with fundamental environmental concepts that may permeate social studies subjects.

To help pre-service teachers and supervisors realize the totality of the environment as a fundamental base for interdisciplinary relations among school subjects.

To familiarize pre-service teachers and supervisors with teaching methodologies such as problem-solving approaches in environmental education, especially with respect to the teaching of the environmental dimension of secondary school social science subjects.
To familiarize pre-service teachers and supervisors with certain activities and experiments essential to and motivating for the learning and teaching of the environmental dimension of secondary school social science subjects.

To familiarize pre-service teachers and supervisors with the development of lesson plans and the preparation of teaching materials in the form of units or modules, etc. on the environmental dimension of secondary school social science subjects.

To familiarize pre-service teachers and supervisors with evaluation techniques and methodologies in environmental education for understanding the progress of secondary school students, as well as the teacher's own teaching effectiveness with regard to the fundamental dimension of secondary school subjects in fulfilment of environmental education objective.

As environmental education is becoming a common denominator for almost all educational renewal, it would seem essential to orient pre-service teachers and supervisors towards strategies for planning, development, implementation, management and evaluation of curricula in Environmental Education.

2. Meaning of Environmental Education (EE)

Environmental Education (EE) can be defined in many ways but summarily EE is an action process related to the work of almost all subject areas. It is concerned with the dynamic relationships between man and nature and aims at improving the environment quality.

3. History and Philosophy of Environmental Education

The accelerated pace of environmental degradation has suggested that man has been careless in his attitude towards the environment. Environmental degradation if not checked in time will endanger the existence of the human being itself. There is need therefore for environmentally conscious citizens, who are concerned for saving the environment from disasters.

This naturally means change in the attitude and behaviour of the public and since education has always played a crucial role in the society because it disseminates knowledge, provides necessary skills and helps in forming certain attitudes, education has been seen as a key factor in saving the environment from the total disaster.

Worldwide growing concern regarding the need to do something about the conservation and improvement of the environment for mankind has caused both the national and international communities to organize conferences, seminars and workshops to deal with environmental issues and problems. Such conferences have included:-

a) The Stockholm Conference 1972.
b) The Belgrade Workshop 1975.
c) The Tbilisi Conference 1977.

These three meetings among others helped greatly to emphasize the need for and clarify more specifically its underlying philosophy. The conference also spelt out more clearly the objectives, the content and the methodology for Environmental Education than had been done before.

4. Pre-service Training of Secondary school social science teachers and supervisors in Environmental Education

Secondary school students range from 11 - 19 years of age, thus making them the most sensitive groups of population who may be

initiated, involved and prepared for understanding and tackling the environmental problems to the extent possible. Secondary school students are usually receptive, motivated and capable of assimilating an Environmental Education that is value-oriented, community-oriented and concerned with human well-being.

Environmental dimensions may be incorporated in the schools curriculum either by introducing environmental studies as special subject, breaking up the Environmental Education content into units and merge them into different subject areas of by integrating Environmental Education concepts into different subject areas. Irrespective of the ways the Environmental Education is introduced, success of the programme would primarily depend on teachers since they are the central figures in schools. The possibility of integrating Environmental Education into educational programmes and the implementation of such programmes depend essentially on the training of personnel responsible for putting the programme into effect. Pre-service training of teachers is of paramount importance. Recommendation 17 of the Tbilisi Conference emphasizes the pre-service training of teachers and supervisors.

A secondary school social studies teacher is expected to acquire certain competence some which are, unique applications of knowledge, attitude, behaviour and skills to Environmental Education, while the others are general education competencies pertinent to Environmental Education as well as to other disciplines. Secondary school social science teachers should be able to:-

- Identify an environmental problem.
- Investigate the problem.
- Prepare and evaluate possible solutions to the problem.
- Identify possible strategies for social action.
- Evaluate the strategies for social action.

Social studies teachers should study the man-environment relationships at their own level of inquiry and explore the contribution which their subjects can make in the field of Environmental Education. They also need to have some idea of basic concepts in ecology since it would help them

appreciate other interrelated concepts. Environmental Education content could be organized in 4 levels as follows:-

Level I Ecological Foundations.
Level II Conceptual awareness.
Level III Investigation and evaluation.
Level IV Environmental action skills.

In addition to the above, aspects of social environment should form an integral part of Environmental Education courses for pre-service training of social science teachers and supervisors. This is important because values and attitudes are influenced by the socio-cultural environment on the one hand and guide decisions and actions of an individual and/or a society on the other.

5. Essential knowledge about the Environment

The environment must be reviewed in its totality which comprises the whole set of Natural or biophysical and man-made or socio-cultural systems in which man and other organisms live and interact - the natural environment and biological environment. The physical environment is comprised of the atmosphere, the hydrosphere and the lithosphere while the biological environment includes all the living organisms of the biosphere. Within the natural environment topics to be covered would include:-

- atmosphere.
- the hydrosphere.
- the lithosphere.
- the biosphere.
- Ecosystem and the natural cycles.
- Energy flow in the ecosystem.
- Natural cycles and limiting factor concepts.
- the hydrological cycle
- the rock cycle.
- man in the biosphere.
- human population.

Man-made or socio-cultural environment refers to the environment made by man through his various activities. like the natural environment, the man-made or socio-cultural environment is also regarded as a whole set of interlocking systems. It thus refers to all the physical infrastructures built by man and the social

and institutional systems which he has developed. The socio-cultural environment therefore, includes historical, cultural, economic, political, moral and aesthetic aspects of human life. It is important because it conditions the behaviour of the human beings. Topics to be covered in the socio-cultural environment include:-

- Historical perspective of man-made environment.
- New international economic order and equitable distribution of resources and wealth.
- Environmental ethics.
- Environmental decisions.

6. Problems of the Environment

Man's ability to exploit the environment has resulted in modified ecosystem in many parts of the world and has given rise to a number of problems. The nature of these environmental problems are different in various parts of the world. In developed countries, environmental problems mainly relate to pollution, fast depletion of several natural resources and overall damage to the ecosystems. In developing countries, environmental problems relate to poverty, diseases, lack of adequate housing, clean drinking water and safe disposal of human body wastes. High population levels and growth rates are the cause of many such problems. The search for fresh agricultural and grazing land, the depletion of forests for timber and fuel and the intensified use of chemicals for pest control, pasture improvement and crop productivity, all combine to degrade the environment.

At Tbilisi Conference, environmental problems were grouped as follows:

a) Nature of consequences - physical, economic and social consequences.
b) Geographical scale - global, regional, national and local levels.
c) Time-scale - short-term or long-term consequences.
d) Stage of development - social, economic and technological systems.

Environmental problems having physical, social and economic consequences may be grouped under three categories:

a) Resource deterioration - shortage of food, mineral, power and other resources in the face of a rising global population.
b) Environmental pollution - air, water and land causing biospheric destruction including man.
c) Human health and quality of life.
d) Radio activity from nuclear weapons and nuclear energy production.

7. Solution of Environmental Problems

The most practical solutions to our environmental problems are those which involve recycling, using alternative sources of energy and reducing all kinds of pollution in our ecosystems. Identification and solution of environmental problems could be in the following states:-

a) Identifying an environmental problem.
b) Investigation into environmental problem.
c) Possible solutions.
d) Possible strategies for social action.

8. Teaching Methodologies

Teaching methodologies to be responsible to the needs of a particular discipline should take into account the nature of the discipline itself, type and level of teaching ohjectives, learner characteristics, psychology of learning and teaching processes and the resources available. The ultimate criteria of effectiveness of teaching methodologies refers to the extent of success in realizing the stipulated objectives.

a) Determinants of teaching methodology
   - Objectives.
   - Learning activity.
   - Curriculum area characteristics.
   - Instructional objectives.
   - Learner characteristics.
   - Learning psychology.
   - Instructional resources.
   - Organizational support.

b) Specific teaching methodologies
   - Investigatory approach: Scientific inquiry training strategy.
   - Study guide Sheet I - simulation and gaming.
   - Study guide Sheet II - clarifying strategies.
   - Study guide III - beyond the school wall experience.

9. Activities and experiments for Teaching/Learning the environmental dimension in Social Science Subjects:

Environmental Education is a problem - solving approach. Its

teaching/learning is meaningful only when the acquired knowledge and skills are helpful in dealing with real life situations. These may be achieved by including such activities and experiments that will enable the students to make decisions or to choose between alternative solutions of the environmental problems.

Suggested activities and experiments in this module include questions and answers, class discussion and project work. Such activities and projects include suggested activities/experiments for:

a) the need and basis of Environmental Education.
b) essential knowledge about the Environment.
c) essential knowledge about the problems of the environment and their solutions.
d) project work:
   - sanitation in the locality (Project I).
   - water supply (Project II).
   - safeguard against spread of diseases - malaria (Project III).

10. Evaluation

The evaluation in Environmental Education teaching should match the unique characteristics of this curricula area, its specific objectives and the teaching methodologies employed to achieve the stipulated goals. Three major functions of evaluation in Environmental Education teaching should be kept in view:

a) Should help in evaluating pupil progress at different stages of teaching.
b) Should help in diagnosing pupil difficulties in learning.
c) Should serve as a mechanism for improving teaching.

The three functions imply that evaluation in Environmental Education is a continuous activity to be conducted at different stages of teaching otherwise called formative evaluation. The focus of evaluation in Environmental Education teaching is on the degree to which the pupils are achieving the objectives of a particular lesson, unit or module. This assessment requires the type and tools of measurement which depend on the objectives to be assessed. The process of evaluation in Environmental Education teaching, its components and its utilization have been conceptualized in Figure 2.

11. Strategies for planning, development, implementation, management and evaluation of the Environmental dimension of Secondary School Social Studies Curriculum

Curriculum development is a process of translating educational goals into practice. Like any other curricula area, Environmental Education curriculum requires appropriate strategies to plan, develop, implement, manage and evaluate the realization of goals of Environmental Education.

Environmental Education is not a separate discipline but an approach. It draws its content from different disciplines. Like Environmental Education Social Science Subjects also strive for national development and social consciousness. As such social sciences can contribute a lot to promote Environmental Education. All that is required is proper planning to facilitate development of Environmental Education curriculum, its implementation, management, and evaluation. Environmental Education programmes could be made effective if curriculum in Environmental Education is prepared from the national point of view and examples selected from all levels - global, national, regional and local.

Environmental Education curriculum can be organized to follow either an interdisciplinary (as a single subject) model or multi-disciplinary (infused with different subjects) model depending on the structure of the school curriculum. At the secondary level, an interdisciplinary approach seems to be more appropriate.

Once the decision is taken to introduce Environmental Education in the school curriculum, then the following needs to be done:-

a) Curriculum planning and development.
b) Curriculum implementation.
c) Environmental Education Curriculum management.
d) Curriculum evaluation.

12. Conclusion

We have to make efforts to live in harmony with nature. We also have to correct many of our wrong doings causing environmental disasters. Some of the environmental actions, which may be useful in restoring environmental quality are as follows:-

a) Population planning and control.

b) Use of multiple crop rotation to prevent soil degradation.
c) Afforestation and planned cutting of trees from the forests.
d) Enforced (by law) revegetation of mining wastelands.

DISCUSSION GUIDE

- To what extent do Social Sciences contribute to the teaching and learning of Environmental Education?

- State major environmental issues in the East African Region.

- How would you infuse Environmental Education into the content and methodology of teacher training towards the same issues?

- In the context of Figure 2 pg. 109 of module 9, Suggest a mechanism for evaluation of Environmental Education in the Social Sciences?

Social sciences are very important to us because most of them focus on the study of man just as major environmental problems start with man. Social sciences try to study man and let him live in harmony with the environment. Hence the two subject areas complement each other naturally.

Christian Religious Education, Islam and other religious have been found to play a vital role in the making of man, especially in advocating love, unity and consideration for others while discouraging greed and selfishness etc. These are very important issues and are related to environmental concerns.

History, Geography and Civics contain a huge body of knowledge and skills useful in Environmental Education. It was also noted that cultural knowledge gained over the years can be used for teaching and learning of Environmental Education. It was argued that Social-cultural aspects of an area should be used in teaching and learning. There is need therefore for Social Science teachers to recognize and utilize the existing civilization aspects to promote environmental protection. Although there is great variation in the beliefs in different religions, the sense of humanity, unity and love are found in all religions and are very vital in environmental concerns and can serve the development of Environmental Education.

Environmental Problems within the East African region were grouped into three major areas:

- Problems related to interraction with the natural environment e.g. floods, lightning, drought, hailstorms, pests invasion.
- Environmental problems related to poverty and under-development e.g. Malnutrition, sanitation, overpopulation, existence of shanties, illiteracy etc.
- Environmental problems related to development and technology. This has given rise to large scale pollution of air, water, soil and sound.

The best way to infuse these issues into curriculum for colleges and schools is to select and assign relevant topics to appropriate existing disciplines according to the particular institution.

There is general agreement that the model of evaluation provided in module 9 figure 2, page 109 gives a very comprehensive way of evaluation.

As a matter of emphasis, it was pointed out that there is need for pretesting of teaching and learning materials as well as the level of academic attainment of the students before exposure to Environmental Education.

Participants recognized the huge amount of knowledge and skills within social sciences that can be used in tackling environmental problems.

The role of social sciences in shaping and directing man to major environmental issues was considered to be important.

In this way both science and social sciences are complementary to environmental , protection and improvement.

B. ENVIRONMENTAL EDUCATION: MODULE FOR IN-SERVICE TRAINING OF SOCIAL SCIENCE TEACHERS AND SUPERVISORS FOR SECONDARY SCHOOLS, Unesco-UNEP IEEP, 1985 (EE Series No. 10).

Miss A. B. Rego, Head of Environmental Science Department, Kenya Science Teachers' College prepared the resume' of and a discussion guide on the above module. She presented the module at the workshop and led the plenary session discussions on it. Following are the above mentioned resume' and discussion guide along with conclusions drawn from the working groups and plenary session discussions.

R E S U M E '

INTRODUCTION

This module focuses on the in-service training of social science teachers and supervisors in Environmental Education for Secondary schools. This aspect of in-servicing was emphasized in the 1977 Tbilisi Conference, Recommendation 19 which encouraged states to take the necessary steps to make the in-service training of teachers available to all those who need it.

Currently, this is being implemented through the IEEP started in 1975. Hopefully this module will specifically help the interested Social Science teachers and supervisors in Environmental Education, both as individuals and as members of the communities in the different secondary schools.

In this context the social science teachers are identified as those concerned with the teaching of Art, Civics, Ethics, Economics, Geography, History and Social Studies. This module is primarily addressed to these social science teachers and supervisors who have had little or no orientation towards Environmental Education.

It is recognized that these teachers already use much material related to the Environment. Hence it could provide possibilities for the infusion of the environmental dimension when teaching this content. Suitable topics include those of the distribution of

population, types of human settlements, food and water resources, morality codes, the effects of illiteracy and unemployment, degradation and depletion of natural resources, ways in which people organize themselves, their relationships to the natural and social environments, customs, traditions and histories.

This experimental in-service teacher-training module which could serve as a course aims at making the social science teacher competent in fusing the Environmental Education in the social science subjects taught not as a mass of content but as a new perception of relationships and the acquisition of new values within the social science context.

Secondary school students are usually motivated and capable of assimilating an Environmental Education that is value - oriented and geared towards the well-being of societies in a practical manner.

OBJECTIVES

The main objectives of the module may be summarized as follows:

1. To foster the acquisition and transfer of knowledge, skills, and effective attributies (i.e. attitudes and values), concerning the Environment and its attendant problems.
2. To develop competence in the teaching and supervision of the environmental dimension of social science in secondary schools. The content of the module has been organized into 7 chapters for achieving the above objectives and the specific objectives mentioned in item VIII - A - 1: Scope and Objectives.

MEANING OF ENVIRONMENTAL EDUCATION

Chapter 1 provides the rationale for Environmental Education as a new dimension in the education system that focuses on the solution of Environmental Problems and the evolution of a new type of development with environmental constraints, commonly referred to as 'Development without Destruction'.

It then outlines the history of events that led to the present status of Environmental Education e.g.

- 1972 Stockholm Conference which stressed the importance of Environmental Education in achieving the desired behaviours in the use and care of the Environment, the setting up of UNEP, and the setting up of IEEP in 1975.
- 1975 Belgrade Workshop.
- 1977 Tbilisi Intergovernmental Conference.

The goals, objectives and guiding principles of Environmental Education are then defined. This section also points out that while Environmental Education deals with global problems, local problems and citizen action is stressed.

Essential knowledge about the Environment

Chapter 2 describes in a detailed manner the essential knowledge about the environment. It explains the concept of the environment which must be considered in its totality i.e. both the natural and the man-made components and the interactions between the two. Basic Ecological concepts are discussed and the influence of human activities on the four interlocking systems of the atmosphere, lithosphere, hydrosphere and biosphere are described. Sub-topics within the biosphere include:-

- Concept of ecosystem.
- Energy flows within ecosystems.
- Natural Cycles e.g. Water cycle.
- World Conservation Strategy.

Aspects of the social-cultural environment include:

- The distribution and growth of human population.
- Human Settlements.
- Industrial Development.
- Transportation.
- Tourism.
- Social organization, etc.

The chapter provides the social science teacher/supervisor with useful background information and selected examples for incorporation in the learning activities of the soical science subject areas. It is well integrated with maps, sketches, tables and diagrams.

PROBLEMS OF THE ENVIRONMENT

Chapter 3 discusses the main problems caused by the modification of ecosystems to meet basic human needs. Actual examples are taken both from the developing and industrial societies and various approaches to the control, prevention and possible solution are suggested.

It is argued that the basic issue underlying all the various environmental problems is that of values and attitudes and it is in this area that the social science teacher can most effectively contribute. The environmental problems are discussed under the 4 headings of:

1. Physical, Economic and Social Consequences.
   Problems that reduce the quality and quantity of a resource, cause biological and chemical pollution and physical disruption. Result in a reduced quality of life in terms of physical, economic and social repercussions.
   a) Qualitative and Quantitative Resource Deterioration.
      - Soil loss.
      - Devegetation.
      - Loss of wildlife.
      - Reduction of atmospheric quality.
      - Exhaustion of mineral/fossil Fuels.

   b) Environmental Diseases - Malaria, Bilharzia, River Blindness.
   c) Chemical Pollution - Fertilizers, Drugs, Heavy metals etc.
2. Geographical Scale - global, regional, national, and local levels.
3. Time-Scale - Short-term or long-term consequences.
4. Stage of Development - Social, economic and technical systems.

The solutions should involve all people. Currently this is achieved through the efforts of both the governments and NGO's but at all times community participation and education is needed.

Solutions involving an integrated and sound ecological approach, include:-

- Recycling of wastes.
- Crop rotation.
- Reafforestation and afforestation.
- Soil Conservation measures e.g. gabions.
- Using alternative sources of energy.
- Various types of controls to reduce pollution.

Major international initiatives in this context include activities such as:

- ICRAF.
- International Drinking water supply and sanitation Decade 1981 - 1990.
- World Conservation Strategy.

TEACHING METHODOLOGIES IN ENVIRONMENTAL EDUCATION WITH SPECIAL EMPHASIS ON PROBLEM-SOLVING APPROACHES

The teaching methodologies presented in Chapter 4 are varied but with special emphasis on the problem-solving approaches. The type of teaching methodology used will depend on a number of factors:-

- the type and level of stated objectives.
- the characteristics of the learner.
- the psychology of learning.
- the teaching process.
- the instructional resources available.

A model of instruction with the 4 components of

- Pre-assessment.
- Objectives.
- Instructional strategies.
- Evaluation.

is discussed and concrete examples are given.
The specific teaching methodologies include:

- The discussion technique.
- The project method.
- The lecture and outdoor education methods.
- Investigations by individuals and/or groups.
- Values clarification.
- Instructional simulations and
- Community resource use.

The teaching methodologies are not completely new but they bring together many techniques that have been developped in other areas and can be effectively used by the social science teacher and supervisor in achieving Environmental Education goals and the stipulated objectives.

A useful, innovative contribution is the lucid exploration of the interdisciplinary approach used in Environmental Education with an actual example.

SUGGESTED EXPERIMENTS AND ACTIVITIES TO FACILITATE THE TEACHING AND LEARNING OF THE ENVIRONMENTAL DIMENSION OF SECONDARY SCHOOL SOCIAL SCIENCE SUBJECTS

Chapter 5 presents a careful selection of tried-out experiments and activities that will enable the students to make wise decisions or to choose between alternative solutions to environmental problems. The problem solving approach is emphasized and the use of groups or team work is encouraged. The continuous development of certain basic skills such as reading with comprehension, questioning, communicating and the interpersonal/social skills useful in the prevention and solution of environmental problems is incorporated. The teaching/learning processes are meaningful only when such acquired knowledge and skills assist in dealing with real life situations e.g. control of common environmental diseases such as malaria and pollution e.g. litter.

The designing of these twenty-five suggested experiments and activities cater for a variety of interest in the secondary school social science subjects and emphasize:

- the need and basis of Environmental Education.
- essential knowledge about the environment.
- essential knowledge about problems of the natural, social and cultural environment.

The experiments and activities include individual and group work, intepretation of diagrams and statistics, class discussions, fieldwork, analysis of newspaper cuttings, artwork and the use of audio-visual resources such as a relevant film and slides.

EVALUATION IN ENVIRONMENTAL EDUCATION

Chapter 6 emphasizes the need for continual on going and carefully planned evaluation in Environmental Education teaching and learning. It should be related to the specific objectives and the teaching methodologies used to achieve the desired goals. The success of an Environmental Education Programme in this context will be measured in terms of its ability to change the behaviour of society. The need

for evaluation is to know what to improve and how to improve it. The major functions of evaluation in Environmental Education should be:-

- To improve learning activities to meet the needs and interests of students and society.
  - (i) - An effort must be made to link all parts of the curriculum, in this case the social science curriculum, by use of an interdisciplinary approach.
  - (ii) - To design a flexible programme of study to meet the desired objectives.
- To improve student's performance at every stage of learning.
- To identify students difficulties in learning and mastery of concepts.

The evaluation is conducted at the different stages of teaching - formative and summative - recording the extent to which the desired objectives of a unit, module or lesson are achieved.

A number of useful evaluation instruments are discussed with examples and appropriateness for Environmental Education. The evaluative tool or techniques must determine the current state of attitudes and values to environmental issues and the success of the environmental issues and the success of the Environmental Study Programme.

Examples of evaluation instruments include:-

- pencil/paper questionnaires to evaluate course content and instructor.
- Essay test items.
- Checklists.
- Rating Scales.
- Self-Reports.
- Verbal responses.

Research is emphasized and the need to undertake revisions promptly is stressed.

STRATEGIES FOR PLANNING, DEVELOPMENT, IMPLEMENTATION, MANAGEMENT AND EVALUATION OF THE ENVIRONMENTAL DIMENSION OF SECONDARY SCHOOLS SOCIAL SCIENCE CURRICULUM

Curriculum development is a process of translating educational goals into practice. A model for Environmental Education curriculum development is presented and discussed in chapter 7. The adoption of appropriate strategies to plan, develop, implement, manage and evaluate the environmentally based curriculum is stressed. As has been emphasized Environmental Education is a new dimension in the curriculum using an interdisciplinary approach.

Hence like Environmental Education Social Science subjects also strive for national development and social consciousness. Hence social science subjects can be effectively used to promote Environmental Education with proper planning. Three suggestions are presented to show how this can be done:-

- To introduce new subject areas.
- To make better use of subjects already in the syllabus.
- To re-structure the content of different subjects.

At the secondary school level, the integrated approach appears to be the most successful.

Finally how this can be done is discussed within each of the various components of the education process.

- Objectives.
- Content.
- Methods.
- Teaching materials.
- Training of personnel.
- Research and evaluation.

To sum up, steps need to be followed in introducing the environmental dimension in the curriculum. These are:-

- Curriculum planning and development.
- Curriculum implementation.
- Curriculum management.

- Curriculum research and evaluation.

Major constraints are:

- Funds.
- Appropriate instructional materials.

A useful glossary is provided with an extensive bibliography. The authors have written with conviction on situations and events within their realm of experience and knowledge. However, the application of ecological principles and concepts in environmental conservation and management hold true in any geographical location and at any economic status.

To conclude, such an experimental teacher training module, if properly used can facilitate the development of attitudes and behaviour that will lead to an improved environment and sustainable development for now and for the generations to come.

DISCUSSION GUIDE

- How is a knowledge and understanding of atmospheric processes useful in the possible prevention and solution of environmental problems? CO_2, CO, Ozone and acid rain?

- What factors should people consider in the modification of the environment to meet basic human needs? Where can the social science teacher and supervisor have greatest impact?

- What approaches can be used effectively by the social science teacher and supervisor to create positive attitudes and motivate commitment of students to combat environmental problems such as desertification, soil erosion, chemical pollution etc?

- Discuss the appropriateness of the suggested experiments and activities for use in classroom teaching and in the clubs. (Topics can include water and air pollution, energy, shelter, infrastructures and services, transport, wildlife, etc.)

- What opportunities and/or limitations may the social science teacher and supervisor meet in:
  - designing a curriculum to include the environmental component?
  - monitoring the success of the curriculum?
  - implementing such a curriculum?
  - evaluation of the curriculum?

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

It was noted during the discussion that knowledge and understanding of atmospheric processes will lead to possible preventive measures and solutions to associated problems. A clear understanding of the ways exhaust fumes from cars are formed can lead to a possibility of dealing with this problem. Careless burning which increases a lot of particulate matter in the air can also be controlled. Such plants as geothermal units should be carefully studied in order to control their effects on the environment.

It was also pointed out that there is need to find a way for a comprehensive mechanism for utilization of natural resources to meet human needs. Use of both complex and simple technologies should be carefully employed in order to avoid adverse impact on the environment. This can only be met through a sound management of the environment.

The role of the social science teacher therefore should be to select appropriate technology to be used in the teaching and learning process so as to promote better quality of life among students and the community.

Some of the approaches that can be used effectively to create positive attitudes and motivate commitment to students include: problem solving; practical projects; field trips and excursions; poems and songs; experiments; departmental co-operation; use of resource personnel, use of government and NGOs source materials on Environmental Education and effective use of clubs and societies.

The suggested activities and experiments are very appropriate and valid for classroom teaching and use by clubs. As regards activity I on page 76, module No. 10, the coat of arms has been used effectively because it can be used to elaborate the concept of values classification.

The use of cartoons on page 98 is also appropriate. They illustrate problems in the social-cultural environment.

In designing a curriculum to include environmental components, the social science teachers and supervisors should have the opportunity to express social-cultural aspects of the environment.

There are a number of limitations that will face the social science teacher/supervisor when designing, implementing and monitoring Environmental Education component. There is likely to be resistance from higher authorities due to the conservative nature of man. There is likely to be limitation of resource materials, lack of experienced personnel and crowded timetables at the schools level among many other constraints.

From the discussion it was concluded that we must cultivate in our students positive attitudes towards the environment. This may be achieved if we involve our students actively in the identification of environmental issues and problems, in the search for their causes, effects, prevention and solution.

IX. A BRIEF ANALYSIS OF ENVIRONMENTAL EDUCATION MODULES FOR PRE-AND IN-SERVICE TRAINING OF TEACHERS AND SUPERVISORS OF PRIMARY AND SECONDARY SCHOOLS

The whole group discussed and reviewed the various modules and made the following points:

DISCUSSION GUIDE

The relevance of teacher training modules studied at the workshop to the Teacher Training Programmes in the sub-region.

Suggested mechanism for the national adaptation of the modules.

DISCUSSION AND RECOMMENDATIONS

During the discussion participants agreed that practically all the Environmental Education modules for Pre-service, and in-service teachers, and supervisors/inspectors for primary and secondary schools are relevant to the East African sub-region, subject to national needs and situations.

It was recognized that Environmental Ethics, which was not included in the modules, should be developed and included in the adapted version of the modules for national use. In the mean time Unesco should arrange for the development of a module on Environmental Ethics that can be adapted in the sub-region alongside with the modules examined.

Participants studied mechanisms for possible adaptation of the modules in the sub-region. All countries represented in the workshop seem to agree on the general aims, objectives, content and methodology of Environmental Education covered by the teacher training modules presented at the workshop. It was also noted that almost all countries have included some aspects of Environmental Education in their school curriculum and teacher training courses. However, Kenya was found to have gone ahead in Environmental Education compared to other countries in the sub-region.

For local adaptation of the modules it was suggested that Curriculum Development Centres study the modules and develop a draft of Environmental Education curriculum for schools and teacher training colleges and then use the normal national channels in respective countries for approval.

Another possible method for adaptation of the modules could be to expose the modules to curriculum development experts, school inspectors/supervisors and teachers for study, change and use into the existing curricula.

X. RECOMMENDED ACTIVITIES AND DOCUMENTS ON TEACHER TRAINING PROGRAMMES TO BE DEVELOPED BY IEEP AT SUBREGIONAL, REGIONAL AND INTERNATIONAL LEVELS

Some of the recommended activities and documents on teacher training programmes in Environmental Education to be developed by IEEP at the subregional, region and international levels should include:-

- Support of study tours of Environmental Education personnel to countries currently teaching Environmental Education.
- Organization of seminars on Environmental Education for heads of teacher training departments of Ministries of Education in the subregion.
- Support for case studies on environmental issues to be carried out in the subregion to serve as input into the development of Environmental Education by interested countries.
- Continued support of institutions already teaching Environmental Education.
- Exchange of information on environmental issues and Environmental Education in the subregion should be encouraged through NIEDA.
- Funds should be made available so that national training workshops could be organized for teaching personnel in teacher training colleges and universities.
- Finally it was agreed that each country would identify institutions that will receive materials on Environmental Education from UNESCO, Paris.

XI. COMMENTS AND CRITIQUES ON DRAFT SOURCEBOOK IN NON-FORMAL ENVIRONMENTAL EDUCATION

Participants read through and held discussions on the Draft Sourcebook in Non-formal Environmental Education on the 22nd April, 1986. The comments and critiques will be used in the revision of the Sourcebook. Various issues were raised concerning specific chapters and general comments were made about the Draft as presented below:

1. Chapters 1 and 2

An overview of Non-formal Environmental Education and Implementation of Non-formal Environmental Education: It was noted that the presentation in the Sourcebook was elaborate and comprehensive. However, the following observations were made:

- A stronger distinction of the differences between the needs of developing and developed countries should be made throughout the book since they are more pronounced than the similarities.
- Use of television and radio is an effective tool of communication in developed countries. It is a limiting factor in getting across messages in developing countries where only few people can afford to own these items.
- Cultural considerations and value judgements should not be made at global level. For example, the pastoral societies should still be allowed to herd cattle but should be encouraged to protect and improve the quality of their environment.
- The Sourcebook is too long. Many readers within the non-formal sector particularly in developing countries would prefer a shorter and well - illustrated Sourcebook than the long reading material presented.
- Since illiteracy rates are still high in developing countries, non-traditional forms of communication e.g. folk art, drama etc. should be used in introducing Environmental Education in the non-formal sector.
- Teachers for the different levels of non-formal Environmental Education should be identified so that they are acceptable to the different sections of the community.
- The varied methods proposed for non-formal Environmental Education were found to be adequate and good.

2. Chapter 3: The Environment:

It was found that the content coverage was very comprehensive and it has nicely and coordinatedly covered a lot of information scattered in many biology texts. However, the content looked to be too detailed for non-formal Environmental Education and

therefore would require some reorganization. It was felt that the chapter would adequately cover requirements of a high school syllabus.

Some areas of the content in the Sourcebook was not accurately presented. The term 'Tropisms" on page 113 is presented in a misleading way. In addition to this, the author does not make any reference to "taxism" in relation to the animals being discussed.

Content is presented in a moving and consistent manner. The following could be corrected to make it look much better:
Page 123 line 5 ..... Ecological Studies .... should be altered to have a paragraph starting with Ecological Studies.

Page 131 section on Disruption and Explotation should be treated under the section on limiting factors on page 128.

Page 142 line 3 should read Define the terms saprophytes, parasites and holozoic, giving relevant examples.

Page 146 .... material flow in an ecosystem should be changed to "Nutrient cycling in an ecosystem" because the section deals mainly with nutrient cycles.

Page 147 line 4 ... very large pools of materials. Give examples to illustrate these materials. Do the same for line 6.

It was felt that a lot of editing is required to correct spellings, grammar and flow of content to avoid repetition.

3. Chapter 4: Environmental Problems

The language used in the sourcebook should be made much simpler because most of the people in the non-formal sector of Environmental Education are likely to be high school leavers or below.

The Sourcebook should provide more varied examples of environmental problems taken from very different countries.
The chapter is presented in the form of a continuous running text. This could be boring as an educational text. It could be improved by including more varieties like diagrams, tables, charts, models, photographs, drawings, newspaper cuttings, quotations etc. Presented

the way it is, the chapter looks like a catalogue of varied environmental problems.

The organization and approach of the various concepts could have been presented as follows:

- definition of the concept being discussed.
- classification of the environmental problem from the natural environment.
- viewing environmental problems globally, within developing and developed countries separately but comparatively.
- integration of solutions to environmental problems in respective sections.
- striking a balance between content and instructional strategies.

4. Chapter 5: Natural Resources

The chapter is well organized but it should give clear explanations for the various scientific terminologies and concepts being used.

The first section should be re-organized to differentiate between stocks, resources and reserves. There is no clear distination made between resource and raw material as the author seems to imply that they mean the same thing.

Sections 5.6 and 5.7 are not well-dealt with in details. The author assumes a lot of background knowledge. There is need to put more flesh onto the skeleton in these sections. Section 5.9 is well dealt with. It was still felt that materials in this section should have been illustrated in a variety of ways.

The chapter does not include References or Bibliography. This should be given.

5. Chapter 6: Energy and its uses

The chapter is comprehensive except that it has not given new sources of energy like biogas comparable exposure. The chapter does not include new and renewable sources of energy.

The language used is technical in the components of energy sources e.g. coal, petroleum etc. Also, it presents complicated chemical reactions leading to the production of nuclear energy.

The language used should be made to match the target group in the non-formal sector to which the material is intended.

It was felt that presentation of this chapter could have followed the approach below:-

- historical development of the energy source.
- current situation of the energy source.
- uses of energy.
- environmental approach, enlisting environmental effects, if any.

6. Chapter 7: Development

The language used in the chapter is difficult to comprehend. The writer seems to expect that whoever will handle the material will be highly specialized. Hence there is need to simplify the language in this chapter considerably.

The chapter does not emphasize cultural aspects in handling environmental problems.

The chapter deals with many aspects of data analysis but does not include environmental statistics in its treatment. This should be included in the chapter.
On the whole, the chapter provides a good framework for adaptation.

7. Chapter 8: Environmental Ethics

The chapter has well covered many religions however it has not included traditional religions and philosophy. Further, it was noted that the author failed to give a clear methodology of how Environmental ethics could be treated in the context of the cultural phenomena.

Environmental ethics play a very important role in Environmental Education. If the missing link on the part of the African Culture is rectified, many of the environmental problems in Africa may be prevented. The inclusion of Islam, Hinduism, Budhism, Zen Budhism etc. has given the chapter a lot of weight. Similar treatment of the African traditional religions and beliefs would have made the chapter a complete masterpiece. It is suggested to add the African traditional religions as well.

GENERAL COMMENTS

From the above specific points on various chapters, the following points were made about the Sourcebook in general:

- The language used look a bit difficult and efforts should be made to simplify it.
- There is need to explain clearly the technical terms used in the sourcebook.
- A wide range of illustrations should be used to make environmental issues more clearer. Pictures, graphs, charts, diagrams, etc. should be included in the sourcebook.
- There is need to strike a balance on the treatment of environmental issues that affect developing and developed countries, more industrialized and less industrialized countries.
- The Sourcebook should be either shortened or presented into two to three volumes.

XII. COMMENTS AND CRITIQUES ON PROPOSED ENVIRONMENTAL EDUCATION SYLLABUS FOR TEACHER DIPLOMA COLLEGES IN KENYA

The syllabus of Environmental Education for Diploma Colleges in Kenya was presented to the participants for discussion. During the discussions, the following points were made concerning the syllabus:

- Participants were of the opinion that objectives were emphasising cognitive domain only.
- There were no objectives which were action-oriented for environmental issues.
- Most objectives were stated globally and do not show specific direction for learners.
- There is need to include more details on the section of Environmental Ethics in the syllabus.

It was further noted that there were no activities or instructional materials indicated. Hence films, project work, textbooks should form some of the teaching-learning resources for the syllabus.

The participants also felt that the syllabus should be reorganized to include goals, specific objectives, activities, teaching materials, time and assessment/ evaluation components that can be easily interpreted or understood.

(for full text of the above syllabus see Appendix - 7)

XIII CLOSING OF THE WORKSHOP

The closing session for the Workshop started at 2.00 p.m. on 25th April, 1986.

Mr. P. W. Munga, Principal of Kenya Science Teachers' College made opening remarks at the ceremony. He informed the Guest of Honour that the Workshop had drawn participants from Ethiopia, Kenya, Malawi, Somalia and Tanzania. Other countries in the subregion expected to participate but were not represented were Rwanda, Sudan and Uganda.

The local participants came from National Environment Secretariat (NES), Kenya Institute of Education (KIE) and Diploma Colleges (Kisii, Moi, Kagumo and Kenya Science). Mr. Munga commended the effort of each participant which made the workshop successful. Mr. Munga then invited Dr. A. Ghafoor, Unesco representative to make closing remarks.

On behalf of Unesco, Dr. A. Ghafoor thanked all the participants for the active role they played during the workshop. He commended the hard and useful work done by Miss B. Rego and Mrs. M. Muthoka in the preparation of the Environmental Education Module for in-service Training of Social Science Teachers and Supervisors for secondary schools which led to the hosting of the Subregion Workshop on Teacher Training in Environmental Education for Africa in Nairobi, Kenya and organized by Kenya Science Teachers College.

He further congratulated the Co-ordinator of the workshop, Mrs. M. Muthoka for her good organization which made the workshop achieve its objectives.

Dr. A. Ghafoor wished the participants a successful future in implementing the outcomes of the workshop. He assured the subregion participants that Unesco is always ready to support such activities geared to improving and developing Environmental Education awareness.

On behalf of the Ministry of Education, Science and Technology, the Chief Inspector of schools, Mr. T. Sitima thanked UNESCO for backing the workshop with technical and financial assistance and Kenya Science Teachers' College for organizing it.

The Chief Inspector of schools hoped that during the workshop, participants had familiarized themselves with the pre-service and in-service teacher training modules in Environmental Education prepared by UNESCO-UNEP International Programme (IEEP). He also expected participants to have explored information and experience in the development of Environmental Education in the Subregion.

The Chief Inspector of schools emphasized that if school teachers were to impart knowledge about the environment and its problems on pupils, the teacher trainers had to pre-service and in-service them effectively. He encouraged each country represented to have a follow-up of the Subregion Workshop with a National Workshop on Environmental Education.

The Chief Inspector of schools stressed the relationships that are cultivated as a result of working together, which eventually help in bringing about international understanding and peace.

He also stressed the need for the recommendations of the Subregion Workshop to be implemented. He requested each participant to play a role in implementing those recommendations which are implementable and also to try and disseminate the ideas therein appropriately.

The Chief Inspector of schools assured the participants that in case of Kenya the deliberations of the Workshop will receive the attention they deserve. He asked the Unesco representative Dr. Abdul Ghafoor Ghaznawi to convey to the Unesco Director General, that Kenya supports Unesco activities of bringing World understanding and international cooperation through the tools of education, Science and Culture.

Finally the Chief Inspector of schools asked participants from outside Kenya to take a few more days to see more of Kenya and enjoy the hospitality of Kenya.

(For full text see Appendix 3(c)).

A vote of thanks was given by Mr. Awash Gebru Kidane, the participant from Ethiopia on behalf of the other participants.

(For the full text, see Appendix 3(d)).

APPENDIX - 1

List of Working Documents

1. Strategies for Developing an Environmental Education Curriculum, Unesco, 1980.

2. Strategies for the Training of Teachers in Environmental Education, Unesco, 1980.

3. Environmental Education: Module for Pre-service Training of Teachers and Supervisors for primary schools, Unesco, 1983. (EE Series No. 5).

4. Environmental Education: Module for In-service Training of Teachers and Supervisors for Primary Schools, Unesco, 1985. (EE Series No. 6).

5. Environmental Education: Module for Pre-service Training of Science Teachers and Supervisors for Secondary Schools, Unesco, 1983. (EE Series No. 7).

6. Environmental Education: Module for In-service Training of Science Teachers and Supervisors for Secondary Schools, Unesco, 1983. (EE Series No. 8).

7. Environmental Education: Module for Pre-service Training of Social Science Teachers and Supervisors for Secondary Schools, Unesco, 1985. (EE Series No. 9).

8. Environmental Education: Module for In-service Training of Social Science Teachers and Supervisors for Secondary Schools, Unesco, 1985. (EE Series No. 10).

APPENDIX - 2

Time-table of work

Monday 14th April, 1986

09.00 hours	-	Registration.
10.00 hours	-	Opening Session.
10.30 hours	-	Tea-break.
11.00 hours	-	Election of the Bureau.
	-	Steering Committee.
	-	Drafting Committee.
	-	Presentation of Country Reports:
		- Kenya.
		- Ethopia.
13.00 hours	-	Welcoming Lunch at KSTC.
	-	Presentation of Country reports:
		- Malawi.
		- Tanzania.
		- Somalia.

Tuesday 15th April, 1986

09.00 hours	-	Presentation on Unesco-UNEP IEEP.
09.30 hours	-	Lecture on Strategies for Curriculum Development in Environmental Education.
10.30 hours	-	Tea-break.
11.00 hours	-	Discussion on the above Module.
14.00 hours	-	Groups work on Strategies for Curriculum Development in Environmental Education.
16.00 hours	-	Reports of Working Groups and Discussion.

Wednesday 16th April, 1986

09.00 hours	-	Lecture and Discussion on Strategies for Teacher Training in Environmental Education.
10.30 hours	-	Tea-break.
11.00 hours	-	Group work on Strategies for Teacher Training in Environmental Education.
12.00 hours	-	Reports of Working Groups and Discussion.
14.00 hours	-	Visit to the Nairobi National Park and Animal Orphanage.

Thursday 17th April, 1986

09.00 hours	-	Lecture on Environmental Education: Module for Pre-service Training of Teachers and Supervisors for Primary Schools.
10.30 hours	-	Tea-break.
11.00 hours	-	Group work on the above module.
14.00 hours	-	Presentation and Demonstrations: (Thogoto Teachers College).
15.00 hours	-	Reports of Working Groups and Discussion.
17.00 hours	-	Dinner.

Friday 18th April, 1986

09.00 hours	-	Lecture on Environmental Education: Module for In-service Training of Teachers and Supervisors for Primary Schools.
10.00 hours	-	Tea-break.
11.00 hours	-	Group work on the above module.
14.00 hours	-	Reports of Working Groups and Discussion on Environmental Education Modules for Primary Schools.

Saturday 19th April, 1986

09.00 hours	-	Lecture on Environmental Education: Module for Pre-service Training of Science Teachers and Supervisors for Secondary Schools.
10.30 hours	-	Tea-break.
11.00 hours	-	Group work on the above Module.
12.00 hours	-	Reports of Working Groups and Discussion.
14.00 hours	-	Films on the Environment.

Sunday 20th April,1986

F R E E .

Monday 21st April, 1986

09.00 hours	-	Lecture on Environmental Education: Module for In-service Training of Science Teachers and Supervisors for Secondary Schools.
10.30 hours	-	Tea-break.
11.00 hours	-	Group work on the above Module.
12.00 hours	-	Report of Working Groups and Discussion.
14.00 hours	-	Visit to the Centre for Research and Training, Karen Village Technology Unit.

Tuesday 22nd April, 1986

09.00 hours	-	Lecture on Environmental Education Module for Pre-service Training of Social Science Teachers and Supervisors for Secondary Schools.
10.30 hours	-	Tea-break.
11.00 hours	-	Group work on the Module.
12.00 hours	-	Reports of Working Groups and Discussion.
14.00 hours	-	Comments and critiques on the draft Source-book in Nonformal Environmental Education for its revision.

Wednesday 23rd April, 1986

09.00 hours	-	Lecture and Discussion on Environmental Education Module for In-service Training of Social Science Teachers and Supervisors for Secondary Schools.
10.30 hours	-	Tea-break.
11.00 hours	-	Group work on the above Module.
12.00 hours	-	Reports of Working Groups and discussion.
14.00 hours	-	Suggested mechanism for local adaptation of the above series modules on teacher training in Environmental Education.

15.00 hours - Identification of Educational institutions for possible adaptation of the above series of modules.

16.00 hours - Recommended activities and documents on teacher training in Environmental Education to be developed by IEEP at subregional, regional and international levels.

Thursday 24th April, 1986

Educational Field Trip to the Rift Valley.

Friday 25th April, 1986

10.00 hours - Study of the report of the Workshop.

12.30 hours - Lunch.

14.00 hours - Closing Session.

---

3. (a) STATEMENT BY DR. ABDUL GHAFOOR GHAZNAWI, PROGRAMME SPECIALIST, IN ENVIRONMENTAL EDUCATION, UNESCO, PARIS

Mr. Chairman,
Ladies and Gentlemen,

It is an honour and pleasure for me to welcome you on behalf of Unesco to the Subregional Workshop on Teacher Training in Environmental Education for Africa. This Workshop is organized under Unesco contract by Kenya Science Teachers College (KSTC) and in cooperation with Unesco-UNEP International Environmental Education Programme (IEEP). The Workshop is conceived in the context of Unesco's Programme and Budget for 1984 - 85 (paragraph 10922).

This workshop is a follow-up to the following activities of Unesco-UNEP International Environmental Education Programme in Africa: Regional Meeting of Experts on Environmental Education in Africa, Brazzaville, September, 1976; Regional Training Workshop on Environmental Education for Africa, Dakar, December, 1978; National Training workshops in Environmental Education in Burkina Faso, Central African Republic, Sierra Leone, Benin, Rwanda, Senegal, Malawi, Ethiopia, Guinea-Bissau, Ivory Coast, and Zaire; and 4 pilot projects in Kenya, Senegal, Upper Volta and Mali.

The objectives of the current workshop are to:

(a) familiarize participants with series of modules on teacher training in environmental education developed under IEEP,
(b) identify institutions for possible local adaptation of the module in the participating member states,
(c) identify activities and documents on teacher training in environmental education to be developed by IEEP, and
(d) enhance exchange of information and experience among participating member states in this field.

The agenda of the workshop involves presentation of country reports, presentation on the background and activities of Unesco-UNEP international Environmental Education Programme, lecture and discussion on strategies for curriculum development and teacher training in environmental education, lecture and discussion on six teacher training modules, identification of institution for local adaptation of the modules, and recommending documents and activities on teacher training in Environmental Education to be undertaken by Unesco-UNEP International Environmental Education Programme at Subregional, Regional and International levels. A number of presentations, visit to educational institutions, and educational excursions have also been accomodated on the agenda of the workshop.

In the context of the above objectives and agenda the following eight documents prepared by IEEP will be presented and discussed at the workshop.

1. Strategies for Developing An Environmental Education Curriculum

   This document was prepared in cooperation with the Universities of Wisconsin and Illinois.

2. Strategies for Developing Teacher Training in Environmental Education

   This document was also prepared in collaboration with a team of teacher educators from the Universities of Wisconsin and Illinois.

3. Environmental Education: Module for Preservice Training of Teachers and Supervisors for Primary Schools.

   This document was prepared in collaboration with a team of teacher educator and curriculum developer from the University of West Indies and the Ministry of Education of Jamaica.

4. Environmental Education: Module for Inservice Training of Teachers and Supervisors for Primary Schools.

   This document was prepared by a team of teacher educators at the National Council of Educational Research and Training (NCERT), New Delhi, India.

5. Environmental Education: Module for Preservice Training of Science Teachers and Supervisors for Secondary Schools.

   This document was prepared by a team of teacher educators from Monash University and South Australian College of Higher Education in Australia.

6. Environmental Education: Module for Inservice Training of Science Teachers and Supervisors for Secondary Schools.

   This document was prepared by a team of teacher educators at the Science Education Institute of the University of Philippines.

7. Environmental Education: Module for Preservice Training of Social Science Teachers and Supervisors for Secondary Schools.

   This document was prepared by a team of teacher educators at NCERT in New Delhi.

8. Environmental Education: Module for Inservice Training of Social Science Teachers and Supervisors for Secondary Schools.

   This document was prepared by a team of teacher educators at Kenya Science Teachers College Nairobi. This is a major reason for having this Workshop organized by and housed here at KSTC so that KSTC's experience could be shared with participants from teacher education institutions in the subregion.

I may add that in the preparation process, the drafts of the above six teacher training modules were circulated to numerous professionals and institutions for comments and critiques in the light of which they were revised. Further, the modules were tested in two Subregional Workshops on Teacher Training in Environmental Education organized in March, 1983 in New Delhi (India), and in July, 1983 in Jamaica. In the light of comments and critiques of these workshops, the modules were further revised and then printed. Thus, we are pleased to provide the participants of the workshop, through these modules, with a pool of experience and thinking of different teams of teacher educators from numerous institutions of higher education from different parts of the World on teacher training in Environmental Education.

In general, each one the above module has the objectives to impart to its target groups:

(a) an understanding of the philosophy, goals, objectives and history of the development of Environmental Educaiton.
(b) essential knowledge about the Environment and its problems,
(c) Environmental Education teaching methodologies and evaluation techniques for teaching/learning, and

(d) strategies for curriculum development, teacher training and management in Environmental Education.

The outcome of the Workshop will be reflected in a substantive final report which will be disseminated to teacher education institutions and professionals active in the development of Environmental Education.

On bahalf of Unesco, I thank the Government of Kenya for facilitating the organization of the Subregional Workshop on Teacher Training in Environmental Education for Africa. I want to thank the Principal and the staff members of Kenya Science Teachers College for hosting and organizing the Workshop in cooperation with Unesco-UNEP International Environmental Education Programme.

It is hoped that the Workshop could result in due course in the incorporation of Environmental Education into preservice and inservice teacher training programmes in the participating Member States.

(b) OPENING SPEECH DELIVERED BY THE DIRECTOR OF EDUCATION, MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY, KENYA, PROFESSOR J. WAITHAKA

Mr. Chairman,
Unesco Representative,
Participants,
Observers,
Ladies and Gentlemen.

From the outset, I would like to welcome you to this Workshop and for those who have come from outside the Republic of Kenya to welcome you to Kenya on behalf of the Government and the people of Kenya.

During your stay here you should feel completely at home and if there is anything at all we can do to make your stay more comfortable feel free to tell the course organisers.

We shall try to offer you the well known African Hospitality. Even more important we have tried our best to ensure that the working environment will be conducive to facilitating smooth deliberations on the very important issues in front of us.

I note with a lot of satisfaction that the theme of this workshop is "Teacher Training in Environmental Education for Africa" and the objectives are:-

1) To familiarize teacher educators with the contents of a series of pre-service and in-service teacher training modules in Environmental Education prepared by the UNESCO-UNEP International Environmental Education Programme.

2) To explore information and experience in the development of Environmental Education in the sub-region.

3) To exchange information and experience in the development of Environmental Education in the sub-region.

This workshop could not have come at a better time in regional and global terms because these deliberations and conclusions will enrich our curriculum in schools and we will be eagerly waiting for these recommendations and deliberations to see what recommendations we could implement in our schools and institutions of higher learning in our country.

The training of Environmental Education is new in the whole world. Being new not much material has been developed to fill our environmental curriculum. Yours is one of the forums which I have no doubt will fill this gap on shortage of teaching materials. You have a big task ahead of you as the outcome of your deliberations are being awaited for not only in the sub-region but indeed worldwide.

I can illustrate what I am saying through the way the modules which will form the working documents have circulated throughout the world. These modules one of which, I am told, was prepared right here at Kenya Science Teachers' College by the lecturers of Environmental Science Department have gone to the four corners of the world in the five continents.

They are being or will be effectively used as resource materials in pre-service and in-service training of teachers in Environmental Education at all levels i.e. Primary, Secondary, Post Secondary, and even in the Education faculties in Universities.

At this juncture, therefore, on behalf of the Ministry of Education, Science and Technology, I would like to extend our heartfelt thanks and appreciation to UNESCO for holding the workshop.

Secondly, I would like my appreciation to be extended to the Principal, Kenya Science Teachers' College and Environmental Science Department for making this arrangement and for having taken part in the activities of UNESCO-UNEP International Environmental Education Programme.

I would like to extend a special welcome to our distinguished UNESCO representative, Mr. Abdul Ghafoor, and the distinguished participants

from Ethiopia, Malawi, Somalia, Tanzania and Kenya, who, no doubt will contribute concretely and realistically, to the major issues involved in the promotion of Environmental Education. This is what we call HARAMBEEE in Kenya, meaning 'Let's Work Together' to achieve a Common Goal of Development without Destruction.

My opening remarks would be incomplete if I did not highlight the Presidential Leadership and the Kenya Government's efforts to promote Environmental Education in a practical way e.g. building of gabions, tree planting etc.

My Ministry has also taken measures to ensure the introduction and encouragement of Environmental Education at all levels of our education system. Materials are currently being developed at Kenya Institute of Education to meet this need.

What we have infront of us is the Spirit of "Harambee" in action at the sub-regional level. You have all our best wishes in achieving the goals you set yourselves to achieve.

With these few remarks, Mr. Chairman, I declare the Workshop opened.

Thank you.

(c) CLOSING SPEECH DELIVERED BY THE CHIEF INSPECTOR OF SCHOOLS, MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY, KENYA
MR. T. SITIMA

Mr. Chairman,
Unesco Representative,
Distinguished Participants,
Ladies and Gentlemen.

Everything that has got a beginning has an end: This is the end of this workshop.

I would like from the very beginning to say how appreciative I am on behalf of the Ministry of Education, Science and Technology to have been invited to officiate at the closing of this workshop on Environmental Education for Africa. I would like to record my

appreciation to UNESCO for backing up this workshop with technical assistance and to Kenya Science Teachers' College for organizing the workshop.

I am advised that there are participants from Eastern and Central Africa - Ethiopia, Malawi, Somalia, Tanzania and Kenya. Among the Kenyans you have representatives from Diploma Teachers Colleges, Kenya Institute of Education, National Environment Secretariat and high schools. You have even been addressed by personnel from a primary teachers college.

For the last two weeks you have been attending this workshop whose theme is "Training of Teachers and Supervisors in Environmental Education". As emphasised by the Director of Education during the opening session, this is a very important topic and yours was one of the forums expected to fill the gap on shortage of teaching materials in this very new topic. It is my great hope that during the two long and tiring weeks you have familiarized yourselves with pre-service and in-service teacher training modules in Environmental Education prepared by UNESCO-UNEP International Environmental Education Programme (IEEP).

You have also no doubt explored information and experience in the development of Environmental Education in the subregion as well as exchanged information and experience in the development of Environmental Education in the subregion. This is an achievement of no mean significance.

Be assured that this workshop is going to open avenues of new knowledge in the field of Environmental Education, as I am given to understand that all of you have been converted and strengthened in Environmental Education. As far as Kenya is concerned, our President H. E. Daniel Arap Moi has led us in action in taking measures to conserve our natural resources, mainly soil, water and forests. He has gone a long way in creating environmental awareness among Kenyans. It now remains for the school teachers to impart knowledge on the Environment and its problems and suggested solutions. They can only do so effectively after you teacher trainers pre-service and in-service them effectively.

I hope each country represented here will have a follow-up of this workshop with a national workshop on Environmental Education.

For those from outside the country we hope your stay has been fruitful and that you have not only been sitting here labouring to formulate some recommendations but that you have been able to get out and visit places of interest within and outside Nairobi.

I am told you have gone as far as Lake Nakuru to admire the flamingoes and traversed the famous Rift Valley with its spectacular volcanic peaks. What is most important besides the deliberations of a workshop of this nature is the relationships that are cultivated as a result of working together which eventually help in bringing about international understanding and peace. And so by the end of this workshop you have created this relationship and you will continue to assist one another in the advancement of knowledge not only in Environmental matters but also in other matters of common interest.

One point I would like to stress is that during my tenure of office as Chief Inspector of Schools, I have attended many workshops, seminars, meetings, symposia, in and outside Kenya. Every time we come out with extremely good recommendations.

Excellent reports are produced and these reports are distributed widely but what is of particular interest and indeed what could be considered as disturbing is that such recommendations and reports are just put away on shelves where they are sometimes covered by cobwebs.

In a nutshell nobody implements, leave alone tries to implement, such recommendations. Nobody looks at such reports and the great knowledge contained therein remain a waste. I hope this pattern will not be perpetuated. Let the recommendations of this workshop on teacher training in Environmental Education be implemented and each one of you will certainly play a role in the implementation process. I am aware you all hold responsible posts in your countries and institutions and I

sincerely hope you will all do your best in implementing those recommendations which are implementable and you will disseminate the ideas appropriately.

I would like to assure you that in the case of this nation the deliberations of your workshop will receive the attention they deserve.

I would also like the UNESCO representative Dr. Abdul Ghafoor, to convey to the Unesco Director General that Kenya supports Unesco activities of bringing world understanding and international cooperation through the tools of education, science and culture.

It is the policy of the Government of the Republic of Kenya to continue supporting Unesco so that this global organization can continue its excellent work in this field. I would like to assure you that institutions like Kenya Science Teachers' College are able to organize seminars and workshops and we look forward to your bringing more such seminars or workshops at your earliest convenience in the future.

Let me conclude by asking you to take a few more days to see more of Kenya and enjoy the hospitality of this country. We have a lot to offer, and with these few remarks it is my great pleasure to declare the subregional workshop on Environmental Education for Africa officially closed.

(d) A VOTE OF THANKS AT THE CLOSING CEREMONY GIVEN BY MR. AWASH GEBRU KIDANE, FROM ETHIOPIA ON BEHALF OF OTHER PARTICIPANTS

On behalf of the Workshop participants and on my behalf, it gives me pleasure and honour, to begin by expressing our deep appreciation to Kenya Science Teachers' College and UNESCO-UNEP International Environmental Education Programme for organizing a sub-regional workshop on teacher training in Environmental Education for Africa.

The objectives of the workshop were to:

a) familiarize participants with a series of modules on Teacher Training in Environmental Education developed under IEEP.

b) identify institutions for possible local adaptation of the modules in the participating member states.

c) identify activities and documents on teacher training in Environmental Education to be developed by IEEP.

d) enhance exchange of information and experience among the sub-region in this field.

The discussions of teacher training in Environmental Education for Africa over the past two weeks demonstrated their urgency and importance for the solution of environmental problems and the whole range of topics which were discussed at the sub-regional workshop were UNESCO-UNEP International Environmental Education Programme, Strategies for curriculum development and teacher training in Environmental Education, lectures and discussions on six teacher training modules, identification of institutions for local adaptation of the modules, visit to educational institutions such as Karen Appropriate Technology Unit, educational excursion to Nairobi National Park and to Orphanage, Lake Nakuru National Park and Lake Naivasha and film shows on "Africa Forest or Desert" and "Living Lakes".

I must say that a great deal has become clear to us after the lectures and discussions which have taken place for two weeks here at Kenya Science Teachers' College. Inorder to achieve the desired effect, Environmental Education must be based on the coherent application of a whole series of measures including policy definition, legislative measures, conceptual efforts, information work among the public and among those in positions of responsibility, the pre-service and in-service training of both primary and secondary school teachers and the preparation of teaching material.

It seems to us that the most important thing now is for concrete action to be taken. We are convinced that the sub-regional workshop and its recommendations will be an important cornerstone along the road to action. I should like to express the certainty and conviction that on our return to our respective countries we will try hard to pursue the work begun depending on the prevailing conditions of the respective countries.

I should like, on my own behalf and on behalf of the workshop participants to express our warm gratitude to Dr. A. Ghafoor, the UNESCO - representative and Mr. P. W. Munga, the Principal of Kenya Science Teachers' College who agreed willingly to host the workshop and provided all the necessary facilities for its proper functioning.

I should like also to express our heartfelt gratitude to Kenya Science Teachers' College staff members for their hospitality and for creating an atmosphere of warmth around us by receiving us cordially in the college and for everything they did to ensure that the workshop proceeded successfuly.

Thank you.

Appendix - 4

LIST OF PARTICIPANTS

1. AWASH GEBRU KIDANE,
   Section Head,
   Secondary Teacher Education,
   Department of Teacher Education,
   Ministry of Education,
   Addis Ababa,
   ETHIOPIA.

2. BARASA RAMADHANI,
   Moi Teachers' College,
   P. O. Box 1125,
   ELDORET,
   KENYA.

3. K'OMUDHO B. O.,
   Head of Environmental Education &
   Information Section,
   National Environment Secretariat,
   P. O. Box 67839,
   NAIROBI.

4. MAWINDO S. B.,
   Lecturer,
   Mzuzu Teachers' College,
   P. O. Box 12,
   MZUZU MALAWI.

5. MBARIRE S. K.
   National Environmental Secretariat,
   P. O. Box 67839,
   NAIROBI,
   KENYA.

6. MOHAMOUD A. M.
   Head, Teacher Training Section,
   Department of Training,
   Ministry of Education,
   P. O. Box 1645,
   MOGADISHU,
   SOMALIA.

7. MUNGA P. W.
   Principal,
   Kenya Science Teachers' College,
   P. O. Box 30596,
   NAIROBI,
   KENYA.

8. MUTHOKA M. G.
   Senior Lecturer,
   Environmental Science Department,
   Kenya Science Teachers' College,
   P. O. Box 30596,
   NAIROBI.
   KENYA.

9. MWANGI B. REV.
Kagumo Teachers' College,
P. O. Box 18,
NYERI,
KENYA.

10. NAMASAKA P. M.
Deputy Principal,
Kenya Science Teachers' College,
P. O. Box 30596,
NAIROBI.
KENYA.

11. MBAKA NJERU,
Tutor, Environmental Science Department,
Kenya Science Teachers' College,
P. O. Box 30596,
NAIROBI.

12. OTEWA J.
Kisii Teachers' College,
P. O. Box 408,
KISII,
KENYA.

13. RAJABU A. R.
Coordinator Basic Services in Community Schools,
Teacher Education Department,
Ministry of Education,
P. O. Box 9121,
DAR-ES-SALAAM,
TANZANIA.

14. REGO A. B. (Miss),
Principal Lecturer,
Head, Environmental Science Department,
Kenya Science Teachers' College,
P. O. Box 30596,
NAIROBI.
KENYA.

15. WAMAE F. M.
Senior Lecturer,
Environmental Science Department,
Kenya Science Teachers' College,
P. O. Box 30596,
NAIROBI,
KENYA.

16. WANASWA ELLEN A. (Mrs),
Senior Curriculum Developer,
Kenya Institute of Education,
P. O. Box 30231,
NAIROBI,
KENYA.

17. YIGA-MATOVU M.,
Associate Research,
African Social Studies Programme,
P. O. Box 44773,
NAIROBI,
KENYA.

18. MULILI I. N.,
Dean of Students,
Kenya Science Teachers College,
P. O. Box 30596,
NAIROBI,
KENYA.

OBSERVERS

1. KARANJA M. N. (Mrs),
National Environmental Secretariat,
P. O. Box 67839,
NAIROBI,
KENYA.

2. KORIR-KOECH DR.,
Kenyatta University,
P. O. Box 43844,
NAIROBI,
KENYA.

3. MOMANYI M. (Mrs),
Kisii Teachers' College,
P. O. Box 408,
KISII,
KENYA.

4. CHARLES. OYUGI LEONARD,
Tutor, Environmental Science Department,
Kenya Science Teachers' College,
P. O. Box 30596,
NAIROBI,
KENYA.

5. RIMBUI Z. K. (Mrs),
KSTC/Kenyatta University,
P. O. Box 30596,
NAIROBI,
KENYA.

LOCAL ORGANIZING COMMITTEE

1. MUNGA P. W.,
   Principal,
   Kenya Science Teachers' College,
   P. O. Box 30596,
   NAIROBI.
   KENYA.

2. MUTHOKA M. G. (Mrs),
   Senior Lecturer,
   Environmental Science Department,
   Kenya Science Teachers' College,
   P. O. Box 30596,
   NAIROBI,
   KENYA.

3. MBAKA NJERU,
   Tutor, Environmental Science Department,
   Kenya Science Teachers' College,
   P. O. Box 30596,
   NAIROBI,
   KENYA.

4. NAMASAKA P. M.,
   Deputy Principal,
   Kenya Science Teachers' College,
   P. O. Box 30596,
   NAIROBI,
   KENYA.

5. REGO A. B. (Miss),
   Principal Lecturer,
   Head, Environmental Science Department,
   Kenya Science Teachers' College,
   P. O. Box 30596,
   NAIROBI,
   KENYA.

6. WAMAE F. M.,
   Senior Lecturer,
   Environmental Science Department,
   Kenya Science Teachers' College,
   P. O. Box 30596,
   NAIROBI,
   KENYA.

LOCAL COORDINATOR

MUTHOKA M. G. (Mrs),
Senior Lecturer,
Environmental Science Department,
Kenya Science Teachers' College,
P. O. Box 30596,
NAIROBI,
KENYA.

UNESCO SECRETARIAT

ABDUL GHAFOOR GHAZNAWI DR.
Programme Specialist in Environmental Education,
Division of Science, Technical & Environmental Education,
UNESCO,
PARIS.

Appendix - 5

REPORT ON FIELD TRIPS:

REPORT ON EDUCATIONAL TOUR OF THE NAIROBI NATIONAL PARK AND THE ANIMAL ORPHANAGE

By

Mrs. Z. K. Rimbui, Kenya Science Teachers' College.

INTRODUCTION

The Nairobi National Park was established in 1946. It covers an area of 114 km^2, and lies some 10 km away from the city centre between Nairobi-Mombasa Railway, and the garden suburb of Langata. It is open at the south-east end to allow for the migration of herds during the rainy season.

The most popular game are large populations of giraffes, wildbeests, elands, Thomson's gazelles, heartbeests, zebras, monkeys along the riverines and a variety of birds. Lions, buffaloes, rhinos, elephants and leopards, the 'Big Give' are all found in the Park except the elephant. Hippos, warthogs, waterbucks and cheetahs can be observed, as well as other creatures including the ostrich, the biggest bird in the world, among other birds.

The animal orphanage was started in September 1963. It houses samples of a number of animals that are found in the country. It also houses animals that are not indigenous to Kenya. These come as gifts to the country or are occasionally left over from circuses. Some of the delightful inhabitants of the orphanage include the hippos, birds, a variety of felines, monkeys, hyenas and other creatures.

Both the National Park and the Animal Orphanage offer one a chance to see some of the remnants of the once large herds of animals that have been greatly reduced with time.

Participants made an educational tour of the National Park. The tour allowed the participants to see some of the animals preserved in:

(a) a natural environment provided by the National Park;
(b) a confined state provided by the Animal Orphanage.

Both the National Park and the Animal Orphanage serve the following functions:

(i) Educational function.
(ii) An opportunity for people to enjoy seeing animals.
(iii) It plays a preservation role.
(iv) The Orphanage in addition provides a home for the sick and the abandoned young animals.

In the National Park participants were able to see giraffes, Thomson's gazelles, elands, warthogs,ostriches, wildbeests, rabbits, kongonis, monkeys, Grant gazelles etc.

The large animals seen on the tour were rhinos and buffaloes. Guinea fowls were the commonest species of birds seen in the National Park.

Workshop participants had a chance to see animals in the Orphanage that were not available in the National Park and some of the ones seen at a distance were seen at close quarters. Some of the most interesting animals seen at the Animal Orphanage were hyenas, ostriches, lions, zebras, tigers, cheetahs, leopards, wildcats, hippos and a veriety of primates like chimpanzees and babons etc.

Another aspect of education which provided soio-cultural dimension was viewing various human settlement along the way to the National Park such as Kibera slum area, the new estates along Langata - Karen road. The most interesting aspect was a short visit to the Uhuru Gardens that are being renovated where the Nyayo Fountain under construction is the most important landmark.

Participants spent a very useful afternoon which was both educative and interesting. There was no time for formal discussions as provided by discussion guides which would have made the afternoon even more interesting. However, most of the points in the discussion guide were taken up informally during the tour.

2. REPORT ON THE EDUCATIONAL TOUR TO THE CENTRE FOR RESEARCH AND TRAINING, KAREN VILLAGE TECHNOLOGY UNIT

By

Mr. Fredrick Wamae, Kenya Science Teachers' College.

INTRODUCTION

On the 21st April, 1986 from 14.30 hours the seminar participants made an educational excursion to the Centre for Research and Training, Karen Village Technology Unit.

The objective of the excursion was to expose participants to an in-servicing institution concerned with many aspects of Environmental Education in Kenya.

BACKGROUND INFORMATION:

The Karen Village Technology Unit was started by Unicef in 1976. It was taken up by the Kenya Government and placed under the Ministry of Culture and Social Services in 1981.

The Unit was charged with the responsibility of training and in-servicing instructors for Village Polytechnics which are situated in the rural areas. Village Polytechnics deal with various environmental problems affecting particular localities where they are situated.

The Unit deals with problems categorized under the following sections:

a) Food processing and preservation.
b) Energy conservation and generation.
c) Home improvement.
d) Water development and conservation.

THE VISIT

The seminar participants visited all sections of the Unit and found them interesting and educative. Participants were curious to know more about the utility of the devises shown and their technology especially as they apply to rural areas. The participants felt that the appropriateness of the technology at the Unit was of a very high standard and would help rural

and urban communities to conserve various basic commodities.

The group, fortunately, met one of the designers of the Unit who took them round and explained concepts and devises found in each section in details.

In conclusion, the participants noted that the Unit has done a lot of research and has come up with the appropriate technology that deals with crucial issues within the environment.

3. REPORT ON THE FIELD TRIP TO THE RIFT VALLEY

By

Mr. Leonard Charles Oyugi, Kenya Science Teachers' College.

INTRODUCTION

On the 24th of April, 1986 the seminar participants had an excursion to the Rift Valley in Kenya, where this particular phenomena is seen clearly. The excursion was organised with the following objectives in mind:

1. To expose participants to various types of Human Landscapes and Settlements.
2. To expose participants to various forms of physical and natural landscapes.
3. To expose participants to various types of Environmental degradation.
4. To correlate human activities to the various physical and natural landscapes.

The excursion started at 7.45 hours from Kenya Science Teachers' College. The participants had the opportunity to see the many coffee and some tea farms en route to the Rift Valley. The targeted stop points were Lake Naivasha and Lake Nakuru National Park.

Lake Naivasha

Lying 80 km south of the Equator and about 100 km northwest of Nairobi, Naivasha Basin stands at an altitude of 1890 meters above the sea level. This is the highest of all Rift Valley lake Basins. The seminar participants stopped at the Lake Naivasha Hotel and had a chance to a boat ride for about 30 minutes where they saw various flora and fauna. The main point of attraction were the Hippopotamus and the abundant bird life. The many fishermen all over the lake confessed to the participants that they had not caught any fish. The participants focussed their attraction to the ecological problem of the lake, the major one being the infestation of

the lake with man-introduced, free-floating weed, Salvinia molesta. The participants then had a cup of coffee at the Lake Naivasha Hotel after which they started their trip towards Lake Nakuru National Park.

LAKE NAKURU NATIONAL PARK

Lake Nakuru on the floor of the Rift Valley, has earned its fame as the home of the greatest bird spectacle in the world - a myriad of often more than a million pink flamingoes. It is 156 kms from Nairobi and about 75 kms from Lake Naivasha by road. The trip followed a road which leads to Lake Nakuru National Park, with an area of 576 km^2, just after Gilgil, which skirts Lake Elementaita and climbs a hill on the southwest side of Lake Nakuru to reveal a panoramic view of this fascinating reserve.

Sporadically, Lake Nakuru is subjected to fluctuations in depth and water-line, a reflection of the rainfall pattern.

The vast flocks of flamingoes which colour its water a delicate pink, and the pelicans which swim and fish with them, use the rising morning thermals of the Rift Valley to gain lift to fly over Menengai Crator, the high rim of a large Volcanic Crator which is 89 km^2 in extent. Although the flamingoes are the most obvious, other inhabitants of the alkaline lake include black-winged stilts, avocets and a mass of ruffs.

Lake Nakuru National Park had a great deal more to offer to the Environmental Education Seminar participants besides its magnificient bird life (which includes voracious raptors that breed in the small cliffs and thick forests on its far shores). There are also a few lions and occasional leopards, numerous buffaloes, and various kinds of antelopes. The participants were able to appreciate the aesthetics of the acacia savannah which surrounds the lake.

The excursion wound up with a steep drive to the top-edge of Menengai Caldera, where a real human destruction of the vegetation was observed en route.

CONCLUSION

It was the general concensus of the Environmental Education seminar participants, that Environmental Education is better conceptualized in the environment and as such the excursion was a step forward in this direction.

Appendix - 6

RESUMES' OF COUNTRY REPORTS

RESUME' OF ETHIOPIA COUNTRY REPORT ON ENVIRONMENTAL EDUCATION BY MR. AWASH GEBRU KIDANE DEPARTMENT OF TEACHER EDUCATION, MINISTRY OF EDUCATION, ADDIS ABABA

BACKGROUND INFORMATION ON THE PHYSICAL, SOCIAL AND CULTURAL ASPECTS OF ETHIOPIA THAT HAVE BEARING ON THE DEVELOPMENT OF ENVIRONMENTAL EDUCATION

Ethiopia is located in East Africa between latitudes $3\frac{1}{2}^{o}$ and 48^{o} East. It covers an area of 1.22 million square kilometers. The country can be divided into two geographical zones: the central plateau or highlands of 1,500 to 3,000 and more meters above sea level; and the surrounding lowlands. The rugged terrain with deep ravines and mountains reaching 4,500 meters high present a serious obstacle to transportation and communication. Relating to the morphology of the country, the climate varies from tropical to temperate and cold continental. There are two main seasons: The rainy season from June to September; and the dry one from October to May. The rainfall varies considerably from one area to another and so does the reliability of the rains.

42,019,418 people inhabit Ethiopia. This figure places Ethiopia as the third most populated country in Africa, after Nigeria and Egypt. About 89% of the population is rural and the rest live in towns and cities. The population growth rate is estimated now at 2.9% per year. This relatively low figure is the result of high mortality rate.

Administratively the country is divided into 16 Regions. These Regions are sub-divided into 106 wrajas(provinces) which, in turn, are sub-divided into 588 woredas (districts). The country is divided into eight planning zones. This scheme is expected to broaden regional participation in the formulation and implementation of socio-economic development programmes and projects

The economy is basically agrarian, cereal crops, pulses, oil seeds, coffee etc. are widely grown and fairly a big number of livestock is reared in the country side. It is believed that there are a good potential of various minerals. However, only gold and platinum are mined at present. In the industrial sector, there are good, beverage,

tobacco, textile, shoe and foot ware, furniture, paper, printing and chemical etc. processing establishments in the country.

Agriculture is the dominant sector of the economy providing about 50% of the Gross Domestic product (GDP), some 90% of the exports and more than 85% of employment.

MAJOR ENVIRONMENTAL PROBLEMS OF ETHIOPIA

The abuse and misuse of the natural resources of the country, mainly of the soil, flora, fauna, and water can easily be observed in all sectors of the economy.

Land Use

It is estimated that Ethiopia loses 2 billion tonnes of fertile top soil every year which is washed out into the Nile, Wabe Shebele and other rivers. Besides the natural causes of erosion, some of the artificial causes have been clearing of forests and shrubs for cultivation and some factors in the traditional ways of farming.

Forestry and Wildlife

Ethiopia had about 48 to 50% of the total area of the country covered by forest about a century ago. This large area has been reduced to about 3 to 5%. Because of the clearing of forests for agriculture, fuel and domestic use, and for constractional purposes, the natural forests have gradually disappeared. As a result of deforestation and settlement, most of the animals were either killed or escaped to the neighbouring countries.

Water Supply

Only 11.6% of the population in Ethiopia has access to safe drinking water. The figure is much less in the rural population. Insanitary living conditions are the causes of many types of diseases.

Health

80% of the health problems in Ethiopia are communicable diseases and nutritional deficiences causing high morbidity and mortality among the peasants and workers.

Education

In the past, religious institutions mainly the church and the mosque played important role in the Ethiopia education although their objective was to spread religion. In the modern educational system

of pre-revolutionary Ethiopia, the objective of education was to create good servants of the ruling class without taking into account the pressing natural and social problems of the country.

Corrective and Preventive methods

In revolutionary Ethiopia, the Socialist principles based on the creation of New man, the right to education for all members of the Society and harmoniously all - round development of personality are implemented step by step. The present educational objective is education for production of Scientific experimentation and for consciousness.

Having realised the alarming rate of deforestation the revolutionary government has given priority attention to the development and expansion of the country's forest resources, reafforestation campaign organized and directed by the Forestry and Wild-life Conservation and Development is being carried out on a wide scale.

With regard to wildlife the Wildlife Authority has shown considerable achievements. Through various means, it educates the mass on the protection of wild animals. Hunting which was a traditional hobby and a sign of heroism is no more practiced.

To overcome the health problems, the Ministry of Health has taken some major corrective and preventive measures.

- Priority has been given to the establishment of additional health centres and clinics while various programmes were formulated to control the total communicable diseases.
- A National Action Committee has been established to promote decade objectives.
- Fresh water for all by 1990.
- Health for all by 2000.
- Rapid assessment of drinking water supply and sanitation situation has been conducted.

Current formal and non-formal Environmental Education Programme

Elements of Environmental Education are incorporated in the various subjects such as natural sciences, social sciences, and home economics.

The social science syllabi, particularly geography, in the lower primary schools lay down the foundation for the study of the immediate natural and social environment. Relevant topics are:

- The Study of the immediate environment (grade 3)
- Conservation of natural resources and basic principles in conservation (grade 10).

Topics that are more relevant in the natural sciences are:-
Discovering the environment, study things in the environment (grade 7)
Habitat, homes for living things - structure of natural communities and their habitat (grade 7).

A long term study of habitat (grade 10)
Conservation of natural resources (grade 12)
Food - balanced diet, food and its uses, types of food (grade 5)

- Health - How water is contaminated, how to filter water for drinking, protection of well (water), poisoned or contaminated food stuff (grade 4)
- How to keep sense organs clean (grade 1).
- How disease is spread (grade 2).
- Man and disease (grade 8).
- Crop plants and their uses to man (grade 7).
- Human Nutrition (grade 11).
- Control of disease (grade 9).
- Smoking and Health (grade 11) etc.

The third subject area which has incorporated environmental problems is home economics. The following are the major contents included in the various grades:

- water and air pollution (grade 5).
- sanitation in and around the home (grade 9).
- Responsibility of the individual for environmental health and sanitation (grade 10).
- Care and development of children.
- Clothes - uses of cloth, cleanliness of cloth.
- Nutrition - The symptoms of diseases caused by nutrition deficiency, importance of food.
- Health - personal hygiene etc.
- House Management - sanitation.

Teacher Training

The four curricula areas - namely health education, nutrition education, Environmental Education and population are not treated as separate subject/courses in the primary school teacher training institutions. However, topics such as food and nutrition, health and sanitation and human relations and family are included in the subject of home economics.

Food, food demands and digestion, parasite and environmental studies are dealt with in Biology.

Nutrition, health and environmental education are incorporated in agriculture. Water project, timber project and labour Education programme are carried out in schools which are intended to enrich the curriculum with environmental issues.

All Ethiopia Trade Union (ALTU), All Ethiopia Peasant Association (AEPA), Revolutionary Ethiopia Women's Association (REWA), Urban Dwellers Association (UDA) and Revolutionary Ethiopia Youth Association (REYA).

Future plans for the Development of Formal and Non-formal Environmental Environment

The Ten year perspective plan (TYPP) places emphasis on the development, conservation and proper utilizations of the country's natural resources i.e. land, soil, water, forest, wildlife and the Environment.

A proposal for the establishment of a National Coordinating Committee of Secretariat .within the organizational structure of the office of the National Committee for Central Planning has been forwarded by the Physical Planning Department. The proposal has been approved by the Executive committee of the Office of the National Committee for Central Planning and is awaiting decision.

The curriculum Department in the Ministry of Education having realized the significance of Environmental Science has proposed a plan to either integrate Environmental Science with other subjects given in primary grades or develop it as a subject independently.

A study group is formed and it is underway to make a research on how to produce qualified teachers to achieve this end and to conceptualize the contribution of Environmental Science to strengthen the Ethiopia Educational System.

In Ethiopia, Curriculum developers have taken the step to introduce Environmental Science as an integrated subject to be taught in the lower grades (1-3) at the experimental stage. Biology, History, Geography, Political Education, Home Economics and Health are integrated under Environmental Science through the simple phenomena encompassing the different subject areas.

Non-Formal Environmental Education

The non-formal environmental aspect can be understood with particular reference to the major activities of the various ministries, departments and mass (public) associations.

The land use, Planning and Regulatory Department in the Ministry of Agriculture is entrusted with the task of preserving and improving the ecological conditions in general and conservation of soil, water and natural vegetation in particular. Its project is also involved in assisting the reaforestation programme.

- The Forestry and Wildlife Conservation and Development Authority plays the role in afforestation and development of game reserve, sanctuaries and National Parks.
- The Ethiopia Water Works Construction Authority make all efforts in making access to safe drinking water.
- The Adult Education Department in the Ministry of Education, responsible for the organization and programming of the literacy compaign, is not only concerned with literacy and numeracy but also with the functional aspect of literacy, agriculture, health, cottage industry etc. The Community Skill Training Centres (CSTC), run by the department, conduct short run training courses in agriculture, handicraft etc.
- The mass media in collaboration with the various departments of Ministries of public associations have programmes designed to make the public aware of the danger of creating imbalance in ecology.

The mass organizations to be involved in Environmental Conservation Programmes are as follows:

RESUME' OF KENYA COUNTRY REPORT ON ENVIRONMENTAL EDUCATION

By: MRS. ELLEN WANASWA, KENYA INSTITUTE OF EDUCATION, KENYA

Background Information

The Republic of Kenya covers an area of approximately 582,646 km^2. Two thirds of the land is arid or semi arid. Kenya lies within the low latitudes ($4^{o}21'$ N and $4^{o}28'$ S). It experiences a diversity of relief and drainage factors. The latitude and configuration greatly affect the climate. Only a small part of Kenya mainly the Lake Basins, the Central Highlands and the Coast experiences sufficiently high and reliable rainfall to sustain a reasonable population. It is the rainfall limitation that mainly restricts a large population of the eighteen million Kenyans to a small part of the country.

Problems and Solutions

Environmental problems in Kenya are closely linked to the utilization of resources. They include deforestation, desertification, floods, drought, soil erosion, pests and diseases and pollution. Both government and non-government effects are being utilized to solve these problems.

Desertification and deforestation are closely linked. They are a result of clearing up natural vegetation to create agricultural land or to generate fuel wood. Sometimes erosion leads to desertification particularly if the erosion is a result of overgrazing. Efforts to conserve forests include tree planting and making it illegal to cut down trees. Desertification is discouraged through the improvement of pasture lands, destocking and planting trees.

Flood problems in arid areas and the lake region is another problem whose solution has been tackled in making attempts to build gabions. The drought problem has not as of now found a solution.

Soil has attracted the attention of a lot of people. Many measures such as destocking, gabion building and terracing have been tried.

The destruction of pests of many types by chemical and mechanical means is also done in Kenya.

Pollution in urban and rural areas is being discouraged through siting of industries, legislation on sewage disposal and possibly through purification of the waste before discharge.

Role of Environmental Education

Formal and non-formal programmes on environmental education do exist. The many environmental problems do render Kenya appropriate for this type of education. The main objectives of Environmental Education have been:

(i) To create an awareness of the environment, how it should be used and conserved.

(ii) To develop correct attitudes towards the tasks related to environmental conservation that will render environmental education welcome.

In the formal school, environmental education is incorporated into several school subjects. There are a number of Diploma Colleges of Education offering Environmental Science in Kenya. The three National Universities have Departments of Environmental Education.

In the informal sector, a number of voluntary organizations team up to promote environmental education through posters and mass media. Commissions go a long way in encouraging environmental education aspects in the country.

Problems of implementing environmental education include lack of necessary finances and relevant manpower. Failure to reach the desired audience through the media is another problem. Some groups of people have attitudes that need changing.

The Future

In an integrated school programme, the teacher educator need to be very particular about providing enough guidance to the teacher who will handle the kind of curriculum we have.

The work of the National Environment Secretariat may need to be stepped up because it is one of the forums for effective discussions about the environment.

Government policies specified under several ministries need to be honoured.

Strategies:

Strategies already in force such as an integrated primary teacher education course should be continued.

- All secondary school teachers colleges ought to offer environmental education as a subject.

- The National Environment Secretariat ought to increase its contacts with training institutions and step up its research activities.

- There is need to draw up a comprehensive syllabus of Environmental Education at the formal and non-formal Education levels.

RESUME' OF MALAWI COUNTRY REPORT ON ENVIRONMENTAL EDUCATION

By: MR. S. B. MAWINDO, MZUZU TEACHERS COLLEGE

PREAMBLE

Malawi, the former British Protectorate of Nyasaland until 1964, lies land-locked by Tanzania to the North, Zambia to the West and Mozambique to the East and South. A predominantly rurally-based population of about 6.5 million people inhabit its surface area of 78,000 sq. km., a third of which is inland water.

Fertile soil - Malawi's major exploitable natural resource at present, has led to the country's present self-sufficiency in food and to agriculture being the backbone of the economy.

MAJOR ENVIRONMENTAL PROBLEMS

These include deforestation, pollution, pests and diseases, unsatisfactory land management. Both government departments and non-government organizations are engaged in activities intended to alleviate these problems e.g. the Ministries of Agriculture, Natural Resources and Forestry, Health etc. have programmes and modules on Environmental Education while such bodies as the Malawi Broadcasting Corporation help in the dissemination of information.

THE ROLE OF THE MINISTRY OF EDUCATION AND CULTURE ON ENVIRONMENTAL EDUCATION

The Ministry has always included aspects of Environmental Education in its programmes at all levels of the Education System. However, recognizing the need to strengthen the teaching of Environmental Education in schools and colleges, the Ministry proposes to continue offering it as an integral part of the existing syllabuses as this will:-

(i) benefit many more students.
(ii) prevent the large expenditure that goes with the introduction of new subjects.
(iii) prevent over-loading the already loaded curriculum.

By strengthening the Environmental Education, the Ministry hopes that:-

1. Students' environmental awareness will be increased.
2. Students will develop an appreciation of the need, importance and
3. Students will be given the opportunity to acquire essential knowledge about the environment and its problems.

The content through which these objectives will be achieved will include those common areas normally covered under Environmental Education viz:

Energy, Ecosystem, Food Production, Pollution, Human Population and Resources through the teaching of Geography, Science, Home Economics, Agriculture at the Primary school level and Geography, Physical Science, Biology, History, Home Economics and Agriculture at the secondary school level. Teacher Colleges will cover the Primary school content. In other words the Ministry plans to adopt the multidisciplinary model of Environmental Education curriculum.

A wide range of strategies will be used in the teaching of Environmental Education namely: Project work or course work, Excursions, Group and class discussions, Debates, Brainstorming, Media, Experiments and Subject clubs and Associations.

Formative evaluation embracing written assignments, observations by the teacher, oral questions, practical tasks and simulations will be deployed while summative evaluation will include written questions and course or project work.

Approach

The Ministry through its subject Inspectors and subject syllabus Committees, will review the current syllabuses and work out appropriate approaches and strategies. Efforts will be made to have more Environmental Education questions at all levels of Government Examinations. This decision to strengthen Environmental Education in schools and colleges will begin this year.

THE SOMALIA COUNTRY REPORT PRESENTED BY MOHAMOUD ABDISALAM MOHAMOUD, HEAD OF TEACHER TRAINING, MINISTRY OF EDUCATION

BACKGROUND OF SOMALIA

Somalia is located in the North-Eastern part of the African continent, known as "the Horn of Africa". It borders Kenya to the South-West, Ethiopia and the Republic of Djibouti to the West, Red Sea to the North and Indian Ocean to the East. It has the second longest coastline in Africa. Somalia's population is 4.5 million people.

CLIMATE

Most of the country is semi-arid. The long rains come during the months of April, May and June, and the short rains come during the months of October, September and December. The North-West part of Somalia gets 508 mm of rainfall per year, while the Southern part of the country (the area between the two rivers, Juba and Shabelle) receive about 468 mm per year. The highest temperature in the year is 46^{o}C while the lowest goes to 0^{o}C.

RELIEF

The country is mountainous to the North and mainly lowland and flat land in the South. Mt. Surad is the highest mountain in the North rising to 2,633 metres above the sea level. Golis Range mountains stretch from Ethiopia in the West to Cape Guardfii in the East. Abundant grass grows in the Southern lowlands during the rainy seasons. The country has two big rivers, River Juba and River Shabelle.

ANIMALS

Animal husbandry in Somalia is based on goats, sheep, camels and cattle. The nomads depend on these animals for meat, milk and butter.

The humped Somalia camel assumes first place among the nomads because it produces good milk, secondly it can stay without water for three weeks and thirdly it serves them as a beast of burden, during migration.

PROBLEMS OF ENVIRONMENTAL EDUCATION

Environmental Education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness between man and nature.

General objectives of Environmental Education are to understand the influence of the existing interactions between man as a social being and his natural environment.

Major problems of Environmental Education are generally based on droughts, diseases and some other similar factors.

The Somalia Government attempts to plan many different measures to solve Environmental Education problems in the country, such as to encourage sanitation programmes, economic development programmes, urbanization of nomads and developing agriculture and industrial activities.

NON-FORMAL EDUCATION

Non-formal Education exists in Somalia, but the execution and success of Non-formal Education programmes are sometimes affected by different factors such as:-

1. Financial input compared to the formal school system. The allocation of funds for the Non-formal sector is inadequate.
2. The formal school system gets full support, while Non-formal Education gets very limited support.
3. Formal school Education is compulsory for the young generation, but this is not the case for Non-formal Education.
4. While the formal school system is almost completely financed by Somalia Resources, most Non-formal Education Programmes are heavily supported by external funds such as:- Women's Education Programme, National Adult Education Centre, Nomadic Education Centres and Regional Education Centres.

It seems that the Government is giving highest priority to formal education and little to non-formal education.

FUTURE STRATEGIES

The Somalia Government is now in a position to develop Environmental Education by means of creating a generation of teachers who will be trained in a functional way, with an open mind of intellectual flexibility,interest in community development, and with personality and initiative to work.

The Government is planning for economic projects, educational projects and other important projects at national level with the help of international organizations.

Decentralization of local needs of the people is in a process to be planned for and implemented by the Government in order to cater for everybody's needs in his region.

RESUME' OF TANZANIA COUNTRY REPORT ON ENVIRONMENTAL EDUCATION

BY: MR. A. R. M. S. RAJABU, TEACHER EDUCATION DEPARTMENT, MINISTRY OF EDUCATION

Background Information

The United Republic of Tanzania is composed of Mainland Tanzania and the Islands of Zanzibar and Pemba. It is located on the East Coast of Africa between the great lakes of the Central part of the continent. It covers a land area of 945,000 square kilometers including 59,050 square kilometers of inland water. Zanzibar occupies an area 1,650 and Pemba 983 square kilometers respectively.

Physically the country falls into three main zones - the island and coastal plain (0 - 240m); the inland plateau (240 - 1300 m) and the lake basins at the maximum height of 1120 m at Mwanza on lake Victoria. To the North is mount Kilimanjaro the highest peak in Africa. Despite Tanzania's sub-tropical conditions and land configuration, much of the environment is harsh. Rainfall amount is low and unreliable giving rise to drought and sometimes floods.

Tanzania has more than 130 ethnic groups. The Sukuma and Nyamwezi, from the Bantu Stock are the majority. The Nilotic Maasai are nomadic. There are also small groups of Khosian and Cushitic peoples.

Most of the people in Tanzania have been resettled in clusters as villages in which social and public facilities are being developed.

Problems and Solutions

Tanzania's economy is based on basic industries, agriculture and exploitation of the country's natural resources.

During 1981, 60 percent of Tanzania's foreign exchange earnings was needed to pay for oil imports. While the modern sector of Tanzania's economy is based mainly on oil and electricity, 90 per cent of Tanzanians rely for their domestic fuel requirements on firewood and charcoal. This has led to the danger of deforestation followed by uncontrolled flooding and soil erosion. 45 per cent of Tanzania is already affected by desertification, while 35 per cent is in danger due to indiscriminate falling of trees, overgrazing and unscientific methods of cultivation. The situation is worse in the central regions of Dodoma, Singida, parts of Arusha, Mara, Mwanza and Shinoyanga due

to mainly overgrazing. Fuel wood for tobacco processing is a contributing factor in deforestation. Herbicides and fertilizers are becoming a great environmental hazard. Use of dynamite in fishing and industrial effluent are great environmental problems.

Measures to alleviate Environmental problems include, afforestation, introduction of better agricultural practices, better planning of human settlements, improved environmental sanitation and introduction of efficient energy utilization such as improved cooking stoves.

Role of Environmental Education

Some of the aims and objectives relevant for Environmental Education are: To provide Tanzanians with a proper education, that is knowledge and understanding, important skills and attitudes appropriate and relevant to the National policies of Socialism and Self reliance; science, technology and vocational training in order to make it possible for them:

(i) to analyse and understand the fundamentals of life and social progress, possible threats and setbacks to survival and designs of strategies for removing these set backs.

(ii) to understand and make the best use of the environment and the country's natural resources, without destroying them, in the struggle for survival and development for the benefit of all.

(iii) to conserve and protect the country's natural heritage for the benefit of future generations.

Environmental Education as a subject is not taught in Tanzania schools. The situation tends to be that younger primary school children learn concepts such as classification skills, enquiry skills, communication skills etc. using the richness of the environment. There is a lot that can be learnt about the natural ways of life of flora and fauna and energy resources. However, these concepts develop further in the upper classes of primary and in secondary schools whereby specific knowledge and understanding of Biology, Soil science, hydrology, climatology are developed, often using techniques based on Physics and Chemistry.

Tanzania's secondary education has been vocationalized into Agriculture, Home Economics, Technical and Commerce. These biases play a leading role in tackling environmental problems.

Non-formal education in Tanzania is directed:

(a) to help the people do away with old life styles which hindered the development process,

(b) to provide the people with the principles and abilities for self advancement to the best of their abilities,

(c) to enable the people in every family and village:

  (i) To adapt to better ways of life by applying acquired knowledge, skills, scientific and technological methods in making the best use of their environment and increasing productivity.

  (ii) To understand and accept the practical implications of moral and ethical principles, policy of socialism and self reliance and the benefits of cooperative endeavours.

(d) To cultivate an awareness in the elites, that they have the important role and responsibility to develop the nation in consonance with their academic and professional abilities.

Much of the non-formal programmes are implemented through the solution of problems with which farmers or workers actually recognize themselves. One such programme was afforestation campaign in which the public was taught methods of conserving the environment and how to maintain it. Books, charts, posters, films, discussion groups and field demonstrations were used in educating the masses.

The future

The education system in Tanzania towards the year 2000 will put a lot of emphasis on environmental education. Recommendations of the 1982 Presidential commission on Education as approved by the Party and Government have emphasized among other things the use of the environment and the country's natural resources without destroying them in order to promote survival and development. A comprehensive programme of child survival and Development from 1987 - 1991 incorporate in school curriculum major practical and theoretical aspects of nutrition, health and environmental sanitation. Health inspection, school food production and feeding will be practised using school produce.

Agriculture as a subject, introduced since the beginning of 1986, incorporates soil and soil erosion, plant growth and soil fertility, trees and afforestation, crop patterns and planning of school farm and farming economics, water and irrigation in the syllabus and this is practised through project-centred approach.

Pre-service and In-service teacher training will incorporate similar programmes for primary and secondary school teachers. Serving teachers will undergo training in agriculture and some aspects of child survival and development, environmental sanitation, health education and nutrition.

APPENDIX 7: PROPOSED ENVIRONMENTAL EDUCATION SYLLABUS FOR TEACHER DIPLOMA COLLEGES IN KENYA

INTRODUCTION

The Environmental Education course at Diploma Colleges envisages to impart environmental concepts aimed at producing students who ultimately meet three fundamental goals as stated below:

1. The goal of Teacher Education in Diploma Colleges is to prepare secondary school teachers who are capable of teaching two subjects and Physical Education, who are able to communicate to students and are aware of environmental problems and concerned with the solution.
2. The goal of Kenya's education. "To prepare and equip the young to be happy and useful members of society". (Ministry of Education Curriculum Guide for secondary schools, Jomo Kenyatta Foundation, 1973).
3. The goal of Environmental Education for teachers of developing in individual students ".... awareness, understanding and concern for the environment with its associated problems and the knowledge, skills, attitudes, motivation and commitment to work towards solving the problems".
   (Environmental Education at the Tertiary level for Teachers at the Belgrade Conference, 1975).

OBJECTIVES

1. To make the students aware and concerned about the Environment and its associated problems and possible solutions.
2. To increase the knowledge of the students by focusing on the specific nature of the Local Environment as well as considering the world-wide consciousness of environmental phenomena.
3. To develop positive attitudes and skills (manipulative, observational and thinking) necessary in identifying and analysing environmental problems and developing logical approaches to their solution.
4. To enable the student teacher to integrate the teaching of environmental concepts, principles, problems and issues when teaching other disciplines.

COURSE STRUCTURE

1. Introduction to Environmental Education.
2. Ecology and Management of Natural Resources.
3. Environmental Issues
   (a) Population and Human Settlements.
   (b) Food and Nutrition.
   (c) Energy, Technology and Environment.
   (d) Health and the Environment.
   (e) Environmental Pollution.
   (f) Natural Disasters.
4. (a) Environmental Management.
   (b) Environmental Ethics.

COURSE CONTENT

INTRODUCTION TO ENVIRONMENTAL EDUCATION

Specific Objectives

At the end of the topic the students should be able to

(a) describe the concepts of
   (i) Environment.
   (ii) Environmental Education.

(b) explain the development and relevance of environmental education.

(c) explain the relationship between environment and development.

(d) be aware of the theories of evolution and their relevance to Environmental Education.

Course Content

1. The concepts of Environment and Environmental Education.
2. The Development of Environmental Education.
3. Relevance of Environmental Education in Kenya.
4. Environment and Development.
5. Theories of evolution.

Specific Objectives

The student should be able to:

(a) explain the principles, concepts and functioning of ecosystem.
(b) use instruments to measure some parameters of the physical environment.
(c) outline the concepts of environmental conservation and natural resources and interpret them to Action in the Kenyan context.
(d) identify the causes and describe the consequences of the process of desertification.
(e) be aware of the control measures to combat desertification.

CONTENT

1. Ecology and Ecosystems.
   Principles of Ecology.
   Concepts of Ecosystem.
   Functioning and main types of Ecosystems.
   Carrying capacity of Ecosystems.
   Ecologocal Succession.

2. Use and Handling of Meteorological Instruments.
   Recording and analysis of meteorological data, environmental problems associated with atmospheric phenomena e.g. CO_2, CFC's and Acid Rain.

3. Concepts of Conservation and Natural Resources, types and trends to natural resources. National and World Conservation Strategies.

4. Conservation and Management of soil, causes of accelerated soil erosion in Kenya. Physical and Chemical properties of soil. Soil Conservation efforts in Kenya.

5. Conservation and management of water resources in Kenya.
   Water budget and water balance studies.
   Institutional framework for water development.

6. Conservation and management of wildlife in Kenya.

DESERTIFICATION

Specific Objectives

(a) The student should be able to understand the causes and consequences of the process of desertification.

(b) The student should be aware of the measures to control desertification.

CONTENT

Desertification

(a) The process of Desertification.
Extent of Desertification, global, subregional, regional, network and local scale.

(b) Causes and consequences of Desertification (Green Belts, IPAL, Desertification Control (PACD)).
The Sudan-Sahelian Region and Kenya as case studies.

POPULATION AND HUMAN SETTLEMENTS

Specific Objectives

The students should be able to:

1. describe and interpret the dynamics of human population.
2. explain the implication of population change and the economic development.

CONTENT

1. Importance and Sources of Demographic Data (Census and Registration).
   Factors influencing population Growth.
   Impact of population change on the economy.
   Age - sex structures of Developed/Developing Societies.
   The Kenya Government Population Policy and Programmes.
2. Human Settlements

   Patterns, problems and trends of Human settlement, urbanisation and related problems.

FOOD AND NUTRITION

Specific Objectives.

The students should be able to:

1. describe the aspects of food production, marketing, storage and distribution in Kenya.
2. identify alternative sources of food.
3. explain the importance of proper nutrition.

CONTENT

Purpose of food and proper nutrition.
Food habits and Taboos.
Food production, marketing, storage and distribution in Kenya.
National Food Policy.
Alternative sources of food supply.
Food contamination and food additives.

ENERGY, TECHNOLOGY AND ENVIRONMENT

Specific Objective

The students should be able to explain the relationship between energy technology and economic development.

CONTENT

Energy and Economic Development.
The 'energy crisis' and its impact on developed and developing economics (e.g. U.K and Kenya).
Development of New and Renewable sources of energy.
Development of Technology.
Application of Appropriate Technology to energy needs.
Energy conservation in Kenya.

HEALTH AND ENVIRONMENT

Specific Objectives:
The students should be able to:

1. define the concept of health.
2. identify the health hazards and their possible control measures.

CONTENT

1. Concept of 'Health' and its impact on Development, Primary Health Care.

2. Human health hazards i.e. common environmental diseases and their control e.g. cholera, malaria, and schistosomiasis (bilharzia).
3. Chemical health hazards as Drug abuse, alcohol, smoking, heavy metal hazards etc.
4. Social health hazards e.g. Psychological stress.

ENVIRONMENTAL POLLUTION

Specific objective

The students should be able to identify various pollutions in the environment and their possible control measures.

CONTENT

1. Land pollution:
   (a) Disposal of solid and liquid wastes,
   (b) Use of fertilizers and pesticides and their control.
2. Water pollution: organic and inorganic pollutants.
3. Air and Noise pollution.

NATURAL DISASTERS

Specific Objective

The students should be aware of the causes, effects and possible protective measures of natural disasters.

CONTENT

Causes, effects and protective measures of drought, lightning, floods, landslides, earthquakes, volcanic eruptions, cyclones etc.

ENVIRONMENTAL MANAGEMENT

Specific Objective

The students should be able to explain the role of the institutions charged with the management of the environment.

CONTENT

1. Environmental impact, assessment and monitoring e.g. Gems, Remote sensing, KREMU etc.
2. Management skills and techniques e.g. hypotheses, prediction, cost - benefit analysis etc.
3. Institutional framework for ACTION.

Role of Government and NGO's e.g. NES, MENR, Ministry of Energy, Ministry of Water Development, KENGO, WCK etc.

Role of International organisations, e.g. UNEP, Habitat, UNESCO etc.

Role of Research organisation e.g. University of Nairobi, NCST, ICIPE, ILRAD etc.

4. Environmental Ethics.